UC Berkeley
Contributions of the Archaeological Research Facility

Title
Papers on Mesoamerican Archaeology

Permalink
https://escholarship.org/uc/item/14j7b1wt

Authors
Heizer, Robert F.
Stirling, M. W.
Graham, J. A.
et al.

Publication Date
1968-07-01

Copyright Information
This work is made available under the terms of a Creative Commons Attribution License, availalbe at https://creativecommons.org/licenses/by/4.0/

Peer reviewed

eScholarship.org Powered by the California Digital Library
University of California

CONTRIBUTIONS
OF THE
UNIVERSITY OF CALIFORNIA
ARCHAEOLOGICAL RESEARCH FACILITY

Number 5 July 1968

ANTHROPOLOGY LIBRARY

PAPERS ON MESOAMERICAN ARCHAEOLOGY

UNIVERSITY OF CALIFORNIA
DEPARTMENT OF ANTHROPOLOGY
BERKELEY, CALIFORNIA

CONTRIBUTIONS OF THE
UNIVERSITY OF CALIFORNIA
ARCHAEOLOGICAL RESEARCH FACILITY

Number 5 July 1968

PAPERS ON MESOAMERICAN ARCHAEOLOGY

Available Open Access at:
http://escholarship.org/uc/item/14j7b1wt

UNIVERSITY OF CALIFORNIA ARCHAEOLOGICAL RESEARCH FACILITY
Department of Anthropology
Berkeley

CONTENTS

I. INVESTIGATIONS AT LA VENTA, 1967*

Robert F. Heizer, Philip Drucker and John A. Graham

Archaeological Concession No. 5/67 of the Instituto Nacional de Antropología e Historia was issued to R. F. Heizer and J. A. Graham of the Department of Anthropology, University of California (Berkeley), and was effective for the fieldwork period of the month of July, 1967. The main purpose of the investigation was to collect samples of wood charcoal from the main La Venta site and surrounding occupation refuse deposits.

The field investigation was carried out at the archaeological site of La Venta (Tab.) beginning on July 13, 1967 and ending July 22, 1967. We were accompanied for the full period of work by Dr. Philip Drucker. A work crew of seven laborers, locally recruited on the recommendation of Sr. Fermin Torres (INAH guardian of the archaeological zone), was employed. We were aided by Arqgl. Carlos Sebastian Hernandez, Conservador of the Museo del Estado, Villahermosa, who was present from July 13 to 21, and was helpful in numerous ways. Funds for the investigation were provided by the Committee on Research and Exploration of the National Geographic Society (Washington, D.C.) and the Archaeological Research Facility (University of California, Berkeley).

We wish to acknowledge the cordial and effective cooperation of Dr. Eusebio Davalos H., Director of INAH, and Arqgl. José Lorenzo, Jefe de Departamento de Monumentos Prehispánicos, INAH, in connection with securing the archaeological concession. Also helpful in our work was the aid of Dr. Ignacio Bernal, Director of the Museo Nacional de Antropología. We wish to express our thanks to Dr. Carlos Pellicer, Director del Museo del Estado, Villahermosa, for his support. We had the pleasure, during our work, of a visit by our friend, Dr. Warwick Bray, Lecturer in American Archaeology at the Institute of Archaeology, London University.

This report is being published as a matter of record, and is intended as an amplification of our 1955 investigations which are reported in Drucker, Heizer and Squier, 1959 (referred to hereafter as DHS). We feel that a brief report of the 1967 investigations is worthy of permanent and public record, since it may prove useful to the excavator of the future who will visit the important site of La Venta and carry through the incomplete

---

*This is our report submitted in manuscript in August, 1967, to the Instituto Nacional de Antropología e Historia in satisfaction of the provisions in Concesión Arqueología No. 5/67.

examinations of 1942, 1943, and 1955 (reported in Drucker, 1952, and DHS, 1959).

In 1955, aware of the value of charcoal for dating purposes, we collected nine samples. However, to collect most meaningfully, this material was recovered late in the season, when the major structural phases of Complex A had been traced horizontally and vertically, so that the sources of the samples could be identified. This required picking the carbon from the trench walls. In the sun-baked, dusty, long-exposed walls the presence of particles of carbon was obscured, making them difficult to find and creating the impression that the material was uncommon in the structural matrices. In 1967, when primary attention was directed to charcoal collection, we observed that in many layers of fill there is considerable scattered charcoal - in addition to the infrequent instances of *in situ* fires - which, in the freshly dug, brightly-colored clays, shows black and is easy to note. Hence we were able to collect not only more numerous, but also larger, samples than in 1955.

La Venta constructions are of earth (sand and subsoil clays) brought to the locality from some distance away - probably a fairly long distance, so that it is likely the earth fills were transported by boat. Most of the materials, white beach sand and subsoil clays of certain colors, were obviously carefully selected. This is a distinctive feature of La Venta construction, in contradistinction to the practice so typical of many Mesoamerican structures which are built of fill collected from the surface at convenient nearby localities, and which usually contains large amounts of occupational refuse, including sherds, charcoal, and much organic debris. Obviously, charcoal scattered through the fill in such sites may be of earlier date than the construction activity. In Complex A at La Venta, however, where such refuse material was carefully excluded from construction aggregate (despite the erroneous observation by Piña Chan and Covarrubias, 1964:34, that "materiales provenientes de los basureros fueron utilizados como relleno en las construcciones"), it seems highly probable that contemporary charcoal was added at the time the clays were dug and laid down, perhaps derived from ceremonial fires kindled in connection with mining or deposition of the clays and sands, or with some technological procedures used in handling the materials, such as fires for partially drying them to facilitate handling or possibly bonfires and torches for work at night. The latter suggestion may sound unusual in a pre-industrial culture, but it must be recalled that there is clear evidence (presented in DHS, 129) that the refilling of the huge pit in which Massive Offering 2 was deposited was accomplished in a very brief time, so rapidly in fact that no erosion or slumping of the steep-sided pit walls occurred. This was interpreted by us to mean that "the entire job - the digging of the pit, the placing of the red clay bed and the layer of blocks, and the filling of the

pit - must have been accomplished in one single operation, in fact during one single dry season. Otherwise, it is inconceivable that the steep faces of sand, with the heavy overburden of clay, would not have washed out and caved in during the torrential seasonal rains of this area." The magnitude of this single effort would have been such that one might further guess that the work of digging and filling may have been done on a twenty-four hour a day basis, and if so, wood fires may have lighted the area for night-shift workers. It is this kind of possibility for the production of charcoal in the fills that we are thinking about.

Another conceptual possibility is that the charcoal may have been mixed into the clays as an additive in an attempt to reduce the soil-cracking effect to which such materials are subject under the hot sun of the principal dry season, just as sand additives were mixed with clay not only in the ceramics but also in the preparation of the specially colored floor layers. That inclusion of charcoal may have been deliberate and purposeful is corroborated by the fact that a few layers of fill contain no charcoal anywhere in their extent. We argue that if the inclusion of charcoal was intentional, or caused by technique of handling the aggregate, it must have derived from contemporary burning rather than having been collected from occupational deposits of prior date. In the latter case, other occupational trash such as sherds certainly could have been incorporated also.

Investigations in Complex A, 1967

A total of nine pits or trenches was excavated. Four of these, while useful in that they produced carbon which can be dated, were, for our immediate purposes, partly a waste, since they were excavated in order to relocate layers or features which had been recorded earlier in the excavations of 1955. It was necessary to carry out these relocation excavations because all of the monuments in Complex A had been removed since 1955 and no undisturbed surface feature could be found which would permit us to re-establish the site's centerline and the central surveyor's datum point ("Datum 1" in DHS, fig. 4). We finally succeeded in doing this, and at the precise point which was marked by the midpoint of the basalt-column "tomb" (now removed to the Parque La Venta, Villahermosa) which stood on top of Mound A-2, we set, vertically, a section of basalt column 1.91 m. (57 in.) in length. Future excavators at La Venta will find this marker useful and are urged not to remove it.

The excavation units of the work in Complex A in July, 1967, are labeled (after our field designations) Trenches T, U, V, W, X, Y, and Z. They are described below, and their locations are shown on Map 1.

Trench T was 6.1 m. (20 ft.) long (E-W) and 1.5 m. (5 ft.) wide (N-S), and was cut from the court floor with the design of intersecting the Phase IV red clay element on top of the brickwork embankment on which the basalt columns were set to form the enclosure. It was found that the Phase IV red clay had been removed by bulldozers since 1955. The cut was not extended nearer than 1.5 m. (5 ft.) from the basalt columns which are here presumed to be still standing in their original, undisturbed positions, and the pit was not excavated below 0.66 m. (26 in.) beneath the present surface level. Carbon sample No. 30 was collected here. For stratigraphy see Figure 1.

Trench U was laid out 1.0 m. (3.28 ft.) wide (E-W) and 2.0 m. (6.56 ft.) long (N-S). The uppermost 30.5 cm. (12 in.) was loose brown sand (probably recently disturbed surficial materials) lying upon a compact brown sandy clay layer about 20.3 cm. (8 in.) thick. Below this we found, to a depth of 2.13 m. (7 ft.), and presumably continuing to greater depth, a gray and brown mottled clay.

We recognized the gray and brown mottled clay as part of the fill of the large pit into which Massive Offering No. 3 was placed. We did not encounter the cut line of the Massive Offering No. 3 pit.

The gray and brown mottled clay contained abundant small pieces of wood charcoal, the largest of which measured 0.5 by 1.0 cm. Samples Nos. 23 and 24 were collected from the mottled clay at depths of 0.6 to 1.8 m. (2 to 6 ft.) below the present surface. Since the clay is a single-event fill, and if, as we believe, the charcoal is reasonably contemporaneous with the time the clay fill was being collected and dumped into the pit, the age of the charcoal would be that of the clay-collecting and pit-filling activity. However, such assumptions have no positive evidence to support them, and one can say with certainty only that the time of the filling of the Massive Offering No. 3 pit could not have been earlier than the age of the charcoal, but might have occurred later.

Trench V was laid out 2 m. (6.5 ft.) wide (N-S) and 7 m. (23 ft.) long (E-W). The location was selected in the hope that it would intersect the brickwork Court embankment wall. We found, however, that the row of basalt columns which we had assumed at first might be standing in their original positions, and thus mark the line of the western border of the Court, had been recently re-set several meters east of their original line. We were, therefore, excavating a trench at a spot just south of the Northwest Platform, in what was presumably the Court floor.

The western end of Trench V intersected a deep, recently (i.e. post-1955) bulldozed trench which we assume had been dug, about 1958, to remove

the western line of basalt columns. The original upper levels east of the deep bulldozed trench had also been removed, and the first layer which we encountered that could be interpreted as beyond doubt lying in undisturbed position was a brown clay layer 15 cm. (6 in.) thick, the top of which was 76 cm. (30 in.) below the present surface. Carbon sample No. 26 was collected from this layer. Immediately below this lay the familiar Phase III "old rose" floors, which here measured 10 cm. (4 in.) in thickness. These floors rest upon a 46 cm. (18 in.) thick layer of mixed red and yellow heavy clay, which is the fill laid down preparatory to applying the Phase III floors and is therefore also Phase III in time. Below the clay fill were the Phase II white floors, measuring here 15 cm. (6 in.) in thickness. These were cleaned off and excavated with trowels as a unit to recover a charcoal sample (No. 25). Below the Phase II white floors were sandy fills which we did not penetrate in July, 1967.

While we have identified the Court floors described above as belonging to Phase III, we must admit that the brown clay fill resting immediately upon them is somewhat puzzling. In 1955 we noted with some regularity that the Phase IV red clay fill lay on top of the Phase III floors, but here a brown clay occupies that position. It is possible that there were two sets of Phase III floors which were separated by a brown clay interleaf. In this case we would identify the old rose floors found by us in Trench V as the lower and earliest member of the Phase III floors (i.e. IIIA), the brown clay fill layer as Phase IIIB, and with the upper and latest member of the Phase III (IIIB) floors as missing due to post-1955 bulldozing in the Court area. A similar situation appears to have been the case in Trench W (cf. fig. 3).

The section of the south wall of Trench V is shown in Figure 2.

Trench W was staked out 1.3 m. (4.26 ft.) wide (N-S) and 4.5 m. (14.76 ft.) long (E-W). It was begun after Trench X and Trench Y were started, and before the latter two showed any sign of yielding some feature which was recognizable and could be located on our 1955 site map. We were, in short, still reorienting ourselves when we began Trench W without knowing precisely where we were in Trenches X and Y, and this obscurity prevailed for several days until we encountered a familiar construction landmark in Trench X.

As can be seen from the map of Complex A of La Venta (map 1), there was no particular reason to believe that in the Trench W location we could expect to find construction levels and prepared floor surfaces, because we were north of the basalt-column enclosed Court area and beyond the probable limits of the A-2 mound which, so far as anyone now knows (or probably will ever know because of the extensive destruction caused by building the landing strip), marked the northernmost construction feature of Complex A. In

brief, in the Trench W locus it would have been no surprise to find that we were in a spot where only "dead" fill materials had been dumped in order to raise the surface level in the angle between the northwest corner of the Court and the A-2 platform mound. Somewhat to our surprise, we noted a fairly complex stratigraphic event sequence here.

The profile exposed in the east end of Trench W is shown in Figure 3. As observed elsewhere, there has been surface disturbance due to post-1955 activity. The first undisturbed soil layer we noted was a thin remnant, 10 cm. (4 in.) thick, of the Phase IV red clay. Beneath this lies a complicated set of Phase III floors which total 10 cm. (4 in.) in thickness. These are shown in detail in Figure 4a. They are interpreted as the latest of two Phase III floorings and are therefore labeled IIIB. Beneath the IIIB floors is a 40.6 cm. (16 in.) layer of fill consisting of mottled reddish brown - olive brown - tan clays. The fill contains small bits of charcoal (no collection was made of this) and odd loads of different clays. Beneath this fill is the earlier series of Phase III floors which are referred to as IIIA (shown in detail in fig. 4b). The IIIA floors rest on a 15 cm. (6 in.) layer of clay fill of medium brown dense clay. Immediately under this fill are the Phase II white floors measuring 12.7 cm. (5 in.) in thickness, or at least they are so identified because of their color and position below the Phase IIIA floors. Below the white floors is a fill layer 1.2 m. (47 in.) in thickness, which we take to be the Phase II fills on which the Phase II floors were laid. Below this fill is a 10 cm. (4 in.) layer of brown clay which is underlain by artificial sand and clay fills which alternate and interdigitate. We did not attempt (though it would have been informative to do so) to determine how deep these were.

Just below the brown clay layer was a lens of white sand which measured 25 cm. (10 in.) in thickness where it was cut through in the east wall of the trench. The upper 7.6 cm (2 in.) of this layer contained, in an area of 0.37 square meters (4 sq. ft.) in the trench floor, about fifty sherds of undecorated, thick, brown utility ware, and the entire white sand layer was heavily charged with charcoal. Charcoal samples Nos. 11, 18, and 19 were secured here. We are not certain whether these three samples should be assigned to Phase I or Phase II in the La Venta construction sequence. There is a considerable amount of wood carbon in these three samples and it was clearly derived from fires built on the spot. We made the collection in order to provide at least one lot of sufficient size that can in future be drawn upon to serve as a check sample of La Venta carbon. We are now aware of the usefulness of collecting and keeping such large samples as a result of re-running the leftover portions of the 1955 charcoal samples (Berger, Graham and Heizer 1967). In addition, as laboratory techniques improve, it may be desirable to draw from such surplus lots of already dated carbon samples for examination as to sources of error or to provide correction factors.

Figure 3 shows an intrusive pit which must date from a time immediately prior to the laying of the Phase IIIA floors. We caught the northern wall of the pit cut, but beyond this cannot say what its outline or dimensions are, or for what reason it was originally dug. We found nothing in the small section of pitfill which we excavated to suggest why the pit was dug.

Trench X was laid out 1.22 m. (4 ft.) wide (N-S) and 8.53 m. (28 ft.) long (E-W). It is shown in Figure 5. This was the first cut made by us in July, 1967, and was excavated in the hope that it would intersect some familiar feature seen by us in 1955, which would permit us to determine at what point we were in the severely devastated site. The uppermost 0.91 to 1.06 m. (3.0 to 3.5 ft.) consisted of recently disturbed clays and sands, probably the result of removing the basalt column tomb which we later determined was in the immediate area of the east end of the trench. At a depth of 1.06 m. (3.5 ft.) we encountered undisturbed construction deposits and soon observed, about 3.04 m. (10 ft.) west of the east end of the trench, the ancient cut line of a large pit which had been dug through older clay fills and which contained a distinctive filling of layered clays and clean white and brown sand. Hoping that this would prove to be the west edge of the pit in which Massive Offering No. 2 lay, we had the workmen dig within the pit until they reached bottom - a process which took a day and a half and was realized at a depth of 6.55 m. (21.5 ft.) below the present surface. When, as we had anticipated, a single layer of large, flat, well-shaped, serpentine "paving blocks" made their appearance, we knew that we had relocated Massive Offering No. 2. The angle of the cut here was 77 degrees, a figure which agrees fairly closely with the 74 degree angle of the south wall of the pit observed in 1955 (DHS, 129). Five "rows" of blocks were exposed in the bottom of the pit, and we were able to measure some dimensions (all in inches) of eleven blocks.

Length	Width	Thickness
15.50	12.00	2.75
15.25	10.37	2.00
15.50	11.00	2.50
16.00	9.75	2.50
-	12.25	-
-	11.00	-
-	10.25	-
-	9.50	-
-	10.40	-
-	11.75	-
-	11.50	-

Our measurements were incomplete because at the bottom of such a deep pit, whose walls were unstable clays interleaved with loose sands, it appeared possible that the pit might cave in at any moment. Two blocks were lifted and underneath them were found, in immediate contact with the stone, seven small, globular, jade beads of a form already familiar (cf. DHS, pl. 37a,b). We make particular mention of this because in 1955 we did not find (or notice) such beads beneath the blocks of Massive Offering No. 2 exposed in the main north-south trench (cf. DHS, 128-129,pl. 20b). However, the bright red sandy clay layer[1] forming the fill on the bottom of the pit was present, although here it was 6.3 cm. (2.5 in.) thick (compared to 15 cm. [6 in.] noted in 1955: DHS, 129), and on top of this and immediately beneath the blocks was a 3.8 cm. (1.5 in.) thick layer of olive clay. The westernmost line of serpentine blocks was tipped or lapped as though the pit as originally dug was slightly too small for the number of blocks which were intended for it. Other evidence of crowding was noted in 1955 (DHS, 129). Because the ancient La Ventans were reasonably efficient workers, it occurs to us that the tipping, overlapping, and undercutting were done in order to fit precisely a certain number of blocks in this particular pit at a particular moment; otherwise, the pit bottom could have been neatly and tastefully covered by eliminating one or more rows (e.g. one row along the north or south and one along the east or west edges). That this simple adjustment was not made gives us, perhaps, a hint that the large "pavements" were something more than simple pit floorings consisting of stone blocks assembled and deposited merely to fill a space, but rather were ritual depositions of exactly and precisely so many blocks whose predetermined number had special significance. We do not think that we are pressing our observation on block crowding unduly far when we suggest that in the future, when Massive Offerings Nos. 2 and 3 are fully exposed, the arrangement and numbers of blocks should be accurately recorded since some specific hints of numeration and ritual may be determinable.

To the west of the line of the pit which was dug in order to deposit Massive Offering No. 2, we noted an uppermost layer of recently disturbed earth 0.91 m. (3 ft.) in thickness. Below this were undisturbed brown sandy clays, apparently construction fill, about 0.91 m. (3 ft.) thick. Below this layer were denser clays of about the same thickness, which rested upon what we interpret as the Phase I "watersorted floors." Since the two slightly different clay layers, each about 0.91 m. (3 ft.) thick, lie above Phase I floors and are cut through by the Phase IV pit dug for Massive Offering No. 2, the clays must be pre-IV and post-I in time; that is, they

---

[1] Dr. F. H. Stross, Shell Development Co., Emeryville, Calif., has analyzed this clay and informs us that the red coloring is mainly due to iron oxide. Small amounts of cinnabar are also present, but not in sufficient quantity to have a visible coloring effect.

belong either to Phase II or Phase III. The Phase II (white) floors were not distinguishable at this point and apparently had been bulldozed away in post-1955 operations. We are therefore unable to determine with certainty whether our carbon sample No. 4, gathered from the upper sandy clays at a depth of 0.91 to 1.06 m. (3.0-3.5 ft.) from the present surface, dates from Phase II or Phase III, although there is a strong probability that it dates from Phase III.

Toward the east end of Trench X, as we were digging down within the area of the old pit in which Massive Offering No. 2 lay, we encountered at a depth of 2.03 m. (80 in.) below the level of origin of the ancient pit, a 2.5 cm. (1 in.) thick lens of clean white sand which was heavily charged with fine charcoal. This thin, very dark layer had been cut through when the offering pit was dug and a 45.7 cm. (18 in.) long section was exposed in the cut. Sample No. 15 of the carbon-charged sand was collected for possible future dating.

About 1.8 m. (6 ft.) east of the west end of Trench X was the recent cutbank resulting from construction of the landing strip. In the south wall of the trench, at a distance of 6.1 m. (20 ft.) west of the point of origin of the top of the Massive Offering No. 2 pit, and 0.61 m. (2 ft.) below the level of origin of the pit edge, we noted two red-surfaced treads and risers, each tread and each riser 30.4 cm. (1 ft.) in dimension. These remnants, preserved in the surface of the cutbank formed by bulldozing operations after 1955, inform us that the west side of the A-2 mound was terraced in a manner similar to that of the south side, as evidenced in the profiles exposed in the main north-south trench of 1955 (DHS, fig. 10). What we noted in 1967 in the two steps and risers near the west end of Trench X appear to be the equivalent of the h-11 floors (incorrectly labeled "b-11" in fig. 10 but correctly as "h-11" in fig. 11) shown in DHS, Figure 10, and if this is so, the clay fill which it encloses is Phase III. This conclusion supports the earlier suggestion that carbon sample No. 4 dates from Phase III times.

At the same location as the Phase III platform steps just discussed, we excavated a 1.22 m. (4 ft.) section of Trench X (fig. 6) to undisturbed base deposits since we wished to know how much leveling fill had been deposited before the Phase I watersorted floors were laid down. Figure 6 shows the sequence of layers disclosed in the 1.67 m. (5.5 ft.) of fills beneath the watersorted floors, and indicates (by circled numbers) the carbon samples obtained. All of these carbon samples, we believe, are associated with materials deposited as grade fills laid down in order to raise the base level on which the Phase I watersorted floors were deposited. If we compare the position of the top of the "a" base sands in DHS, Figure 10, on top of which lie the "j-2" and "j-3" layers (presumed to be equivalent to the Phase I

watersorted floors), we see that the difference in elevation between a point in the center of the north-south trench and a point 6.1 m. (20 ft.) directly west in the A-2 mound of the original and undisturbed basal sands upon which the La Venta site was erected, is 1.52 to 1.67 m. (5.0-5.5 ft.).

Trench Y was laid out 1.22 m. (4 ft.) wide and 3.66 m. (12 ft.) long, and was begun simultaneously with Trenches W, X, and Z. It was started as one of the blind efforts to encounter a familiar feature that would enable us to learn where we were in the site that we knew so well in 1955 but which, twelve years later, looked like an unfamiliar battlefield.

The watersorted floors of Phase I were located, and from this layer carbon samples No. 17 and No. 20 were collected. Above these floors was a solid fill of mottled pink-yellow-blue dense clay which lacked charcoal, and which represents a fill layer whose extent is unknown to us.

After we encountered the western edge of the cut line of the Massive Offering No. 2 pit in Trench X, we extended Trench W farther east (i.e. toward the centerline) in order to locate the northwest corner of the offering pit, since this point would provide us with the fix we required. A small dividend was our reward for doing this, since we learned some new and interesting facts about the offering pit which had not come to light in 1955. In following the lip of the pit cut eastward toward the centerline from the northwest corner of the pit cut line, we noted the same mottled (Phase III?) clays that also appeared in the west end of Trench Y, and saw how this solidly packed deposit contrasted both in color and density with the looser, more sandy pit fill. Carbon sample No. 16 was collected from the mottled clays into which Massive Offering No. 2 had been intruded at a point 3.66 m. (12 ft.) east of the northwest corner of the offering pit at a depth of 0.76 m. (2.5 ft.) from the present surface, and 0.30 m. (1 ft.) north of the north line of the pit edge (see fig. 7). This point is just north and just east of the midpoint of the basalt column tomb, a point which was selected in 1955 as our central survey datum location (DHS, fig. 4, "Datum 1").

While engaged in following south and east along the top edge of the cut line of the Massive Offering No. 2 pit, we noticed two things that had not evidenced themselves in 1955 when we were dealing with the pit farther south, where we encountered it in the main north-south trench. The first of these matters was that the interior surface of the pit appeared to bear a thin, painted layer (1.5 to 2.0 mm. thick) of purplish-red pigment. The second was that this painted surface was quite flat, and that the plane surface had been achieved by applying a yellowish sandy-clay "plaster" to the sides of the pit, apparently in order to provide a smooth surface. This

interested us, so we took the time[2] to expose the inner surface of the pit for a length of 4.57 m. (15 ft.) east of the northwest corner of the pit to a depth of 1.67 m. (5.5 ft.). What we found is shown here in Figure 8. A band 16 inches high of purplish-red paint occurs at the top of the pit; below this is a 40.6 cm. (15 in.) band bearing no discernible color. Perhaps this stripe was painted with some organic pigment which has disappeared. Below this non-colored strip is a 45.7 cm. (18 in.) horizontal band of black (or deep brownish-black), and below this is a 45.7 cm. (18 in.) band of purplish-red like the topmost one. How extensive this painting is we cannot say, but there are signs that the west wall of the pit was also painted. Only future excavation can answer these questions, and when it is done it will be a task of some magnitude since the pit itself is 15.07 m. (49.5 ft.) long, 6.1 m. (20 ft.) wide, and 4.95 m. (16.25 ft.) deep. Except where we cut the south wall in our north-south trench in 1955, the pit and its contents are still apparently intact.

Trench Z was, like Trenches W, X, and Y, started in the hope of stumbling upon some familiar feature. It consisted of little else than cutting a vertical face in the cutbank. What the exposure looked like can be seen in Figure 9, but since we are dealing with an area lying north and west of Monument 7, it is not possible for us to relate with confidence the section (fig. 9) to the construction features of the A-2 mound, of which it is either a part or to which it must be somehow related. Tentatively, we identify the bedded sands beneath the thin stratum of gray clay as the Phase I watersorted floors, and the series of tan floors and reddish-brown sandy fills may be, taken as a whole, the equivalent of the Phase II floor series. A charcoal sample (No. 12) was collected from Trench Z, from a layer 8.9 cm. (3.5 in.) thick which contained black sherds and relatively abundant charcoal. This layer strongly suggests occupation refuse lying outside the Court enclosure, but whether it represents a unique short term occupation of the spot, or is an equally unique fill layer of refuse gathered elsewhere, we cannot tell. Its radiocarbon age, therefore, may be, but is not certainly, the date of deposition of the layer.

Observations on the La Venta Pyramid (Complex C)

Recent clearing of trees and bushes on the big pyramid south of Complex A permitted us to make a careful surface examination of the structure for the first time. Since 1955 there has been a considerable amount of excavation (apparently "scientific" rather than by treasure-hunters) on the platform at the south edge of the pyramid. The unfilled trenches, some scattered

---

[2] We were in search of charcoal for radiocarbon dating, were very short of time and funds, and therefore had to refuse many temptations to do real archaeology.

sherds, and helter-skelter array of large, flattened slabs of Chinameca limestone show that whoever did the digging must have found something, and that his technique leaves much to be desired. No published report on this extensive excavation is known to us, and we did not learn from local people when and by whom the work was carried out.

We first observed with interest from the airstrip a wide gully in the west face of the pyramid. Since this looked too regular to be due to erosion and too large to be an archaeological excavation, we examined it directly and soon found that there were other such depressions on the outer surface of the feature. Since these depressions occur at fairly regular intervals and are separated by an equally regular series of ridges, we saw that the structure was "fluted" or channeled in a way unlike that of any other known Mesoamerican building. Although we were more than adequately occupied with the digging of Trenches T - Z and Test Pits 3 and 5, we spent part of the day on July 21, 1967, making a plan of the base of the pyramid. Our only equipment was a Brunton compass, a 31 m. (100 ft.) steel tape, and a hand-level, but with this simple apparatus, and aided by two of our machete-wielding workers who cleared a line of sight, cut stakes, and held one end of the tape, we were able to draw a plan of the base of the pyramid.

The base plan of the pyramid which we secured was not at all like that presented in DHS (frontispiece, figs, 4,5). The reasons for so presenting the form of Complex C at La Venta have been detailed separately (Heizer and Drucker 1968), and it is only necessary to say that we relied unduly upon our surveyor, who performed the "survey" and drew the plans. In all fairness, we must admit that in 1955 the pyramid was covered with a fairly heavy growth of vegetation which made observation difficult (see DHS, pl. 2).

The true plan of the base of the great structure is difficult to describe; it can be termed subcircular or suboctagonal. However it is described, it is clearly quite different from the plan presented in DHS. Our recent observations show that the ground plan of the La Venta pyramid is essentially round and not rectangular, and that it is basically a conoidal frustum rather than a four-sided pyramid.[3] Diameter of the base of the pyramid is 128 m. (420 ft.) and the angle of the "side(s)" is 30 degrees.

The "platform" which is shown as regular and rectangular and on which the pyramid apparently rests as presented in DHS (figs. 4,5), is in actuality

---

[3] Other classes of pyramids are: truncated stepped conical (Cuicuilco); true rectangular (Cheops, Chephren, and Mycerinus); stepped rectangular (Zoser); truncated stepped rectangular (Pyramids of the Sun and Moon at Teotihuacán). We are not aware of the existence of any fluted rectangular pyramids.

quite different. Apparently this platform was constructed in order to compensate for major surface irregularities, and because the original ground surface is lower at the south edge of the pyramid than on the north edge, the platform is higher on the south.

Other Excavations

In July, 1967, we dug a series of very small test pits along the east side of Complex A in search of La Venta period refuse deposits which would yield charcoal for dating. A scatter of surface sherds along the low ridge which parallels the east side of the site proved illusory, since wherever we probed we encountered only 1.0 to 1.5 m. of loose brown drift sands, and at best these contained only the merest scatter of La Venta sherds and an occasional La Venta figurine fragment. Below this is clean gray sand or sterile clay subsoil which is apparently pre-occupation in age. These upper brown drift sands are apparently contemporaneous with the period of building and use of the La Venta site, but this particular ridge was not an area of intensive occupation by the people who erected and utilized the site. Our examination was hasty, however, and there is no reason to deny that more testing might yield such occupation evidence. Some high ground lying one to two hundred yards southwest of the pyramid did yield, in two test pits (Nos. 3 and 5), some evidence of sherd- and carbon-rich living refuse. Carbon samples Nos. 8, 9, 10, 14, 27, 28, 29, and 31 were collected from Test Pits Nos. 3 and 5 for future dating. Location of these two pits is shown in Map 1.

ADDENDUM A

Catalogue of Carbon Collected at La Venta in July, 1967

Sample No.	Location	Phase	Notes
1	Trench X	I	See Fig. 6
2	Trench X	II	See Fig. 6
3	Trench X	I	See Fig. 6
4	Trench X	III	See Fig. 5
5	Trench X	I	See Fig. 6
6	Trench X	I	See Fig. 6
7	Trench X	I	See Fig. 6
8*	Test Pit No. 3	-	8-16 in. below surface
9	Test Pit No. 3	-	16-22 in. below surface
10†	Test Pit No. 3	-	+22 in. below surface
11	Trench W	I or II	48 in. below Phase III; old rose floors; see Fig. 3
12	Trench Z	II(?)	See Fig. 9
13	Duplicate of No. 3	I	See Fig. 6
14	Test Pit No. 5	-	34-49 in. below surface
15	Trench X	I	See Fig. 5
16	Trench Y	III	See Fig. 7
17	Trench Y	I	See text p. 10
18	Duplicate of No. 11	I or II	See Fig. 3
19	Duplicate of No. 11	I or II	See Fig. 3
20	Duplicate of No. 17	I	See text p. 10
23	Trench U	III	Depth 24-72 in. from surface; see text
24	Duplicate of No. 23	III	--
25	Trench V	II	See Fig. 2

Sample No.	Location	Phase	Notes
26	Trench V	III	See Fig. 2 and text
27	Test Pit No. 5	-	Depth 64-80 in. from surface
28	Test Pit No. 5	-	Depth 88-100 in. from surface
29	Test Pit No. 5	-	Depth 50-64 in. from surface
30	Trench T	III	See Fig. 1
31	Duplicate of No. 27	-	--
32	Trench X	II	See Fig. 5
33	Trench V	III	See Fig. 2
34	Duplicate of No. 33	III	--
35	Duplicate of No. 33	III	--

* The refuse deposits outside the La Venta ceremonial site are not artificially stratified and divisible into relative sequence periods or phases equivalent to those of the ceremonial site.

† Should be the same as UCLA-1253. Note that location given in Berger, Graham and Heizer (1967:4,15) as 300 feet "northwest" of the pyramid is incorrect; location should be corrected to read "southwest."

ADDENDUM B

RADIOCARBON DATES OF SAMPLES COLLECTED JULY, 1967

Since the previous report was written we have secured a few radiocarbon dates of the charcoal samples collected in July, 1967, through the courtesy of Drs. W. F. Libby and Rainer Berger of the University of California at Los Angeles.

Samples Nos. 5, 6, and 7 were combined and the age determined to be 2300 B.P. or 350 B.C. (UCLA-1330). This is almost certainly too young, and we do not accept it as the true age of the charcoal. It is possible that charcoal buried at La Venta in clay fills which were subject to water percolation or submersion in ground water becomes altered in some way so as to give radiocarbon ages that are too young. We cannot explain what changes occur in the charcoal buried under these conditions, but are certain that such changes do occur.

Sample No. 3 gave an age determination of 2660 B.P. or 710 B.C. (UCLA-1331). This date is also unacceptable in being too young when we compare it to others of equal age as judged from stratigraphy (Berger, Graham and Heizer 1967:5).

Sample No. 26 gave an age determination of 2550 B.P. or 600 B.C. (UCLA-1332). This refers to the Phase III floors and is acceptable in appearing to be of the correct order of magnitude. Phase III at La Venta is not directly dated except for UCLA-1332.

Sample No. 16 (UCLA-1357) gave a date of 1890 $\pm$ 80 years B.P., which seems rather too young for what we judge to be the Phase III fills from which the charcoal was extracted. This charcoal should be about the same age as that of our sample No. 26 (UCLA-1332) mentioned above.

Sample No. 25 (UCLA-1358) from Trench V is believed by us to date from Phase II times. Its radiocarbon age is 1920 $\pm$ 80 years B.P., which again is rather too young judging from C-14 age determinations made in 1967 (Berger, Graham and Heizer 1967).

Sample No. 11 (UCLA-1359) came from Trench W at a depth of 48 inches. Its age is 2060 $\pm$ 80 years B.P. – again much too recent for the Phase I or II construction period assigned to it on the basis of stratigraphy by the excavators.

We have no reason to doubt the accuracy of the age determinations made

in the C-14 laboratory at UCLA, but believe that the apparent ages of the charcoal from samples Nos. 5, 6, and 7 (UCLA-1330), No. 3 (UCLA-1331), No. 16 (UCLA-1357), No. 25 (UCLA-1358), and No. 11 (UCLA-1359) are not the true ages. We believe that these particular charcoal samples have undergone some kind of alteration since they were first buried, and that this change has had the effect of making the charcoal appear to be younger than it is in fact. While we are at a loss to explain what has happened to the charcoal, we are nevertheless unwilling to accept these as the basis for proposing another revision of the age of the La Venta site in radiocarbon years. We believe that some masking effect is present which causes the charcoal to appear to be younger than it is. We suggest that this process is a pedological - geological - chemical one whose nature remains to be identified. We do not believe that the stratigraphic - archaeological - cultural observations are wrong, and we believe that the radiocarbon assays at UCLA have been performed with customary accuracy. For the moment we must leave these as problems to be resolved with additional work.

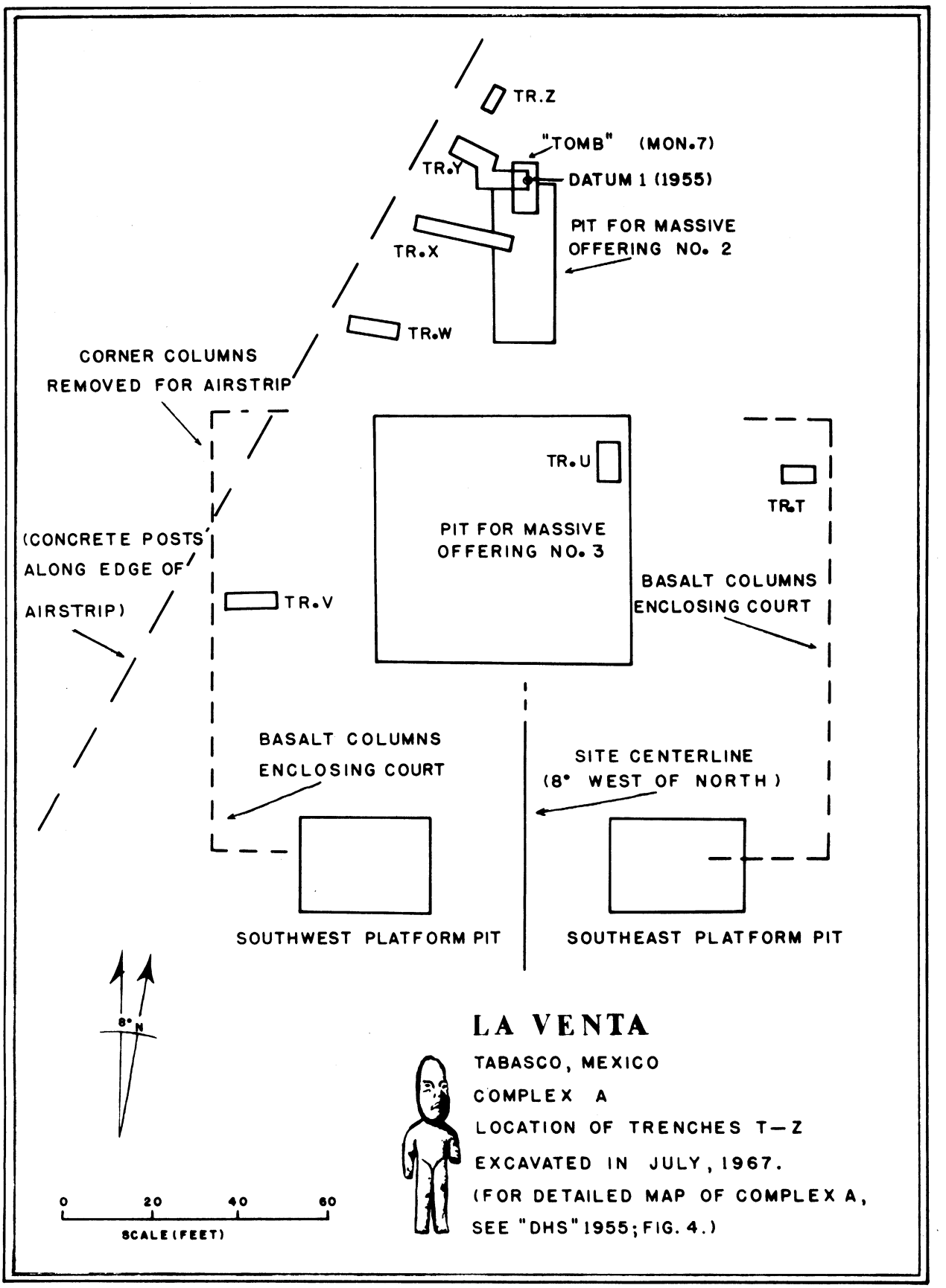
References

Berger, R., J. A. Graham and R. F. Heizer
1967 A Reconsideration of the Age of the La Venta Site. Contributions of the University of California Archaeological Reasearch Facility, No. 3:1-24, Berkeley.

Drucker, Philip
1952 La Venta, Tabasco: a Study of Olmec Ceramics and Art. Bureau of American Ethnology, Bulletin 153. Washington, D.C.

Drucker, P., R. F. Heizer and R. J. Squier
1959 Excavations at La Venta, Tabasco, 1955. Bureau of American Ethnology, Bulletin 170. Washington, D.C.

Heizer, Robert F. and P. Drucker
1968 The Fluted Pyramid (Complex C) of the La Venta Site. Antiquity 42:52-56, Cambridge, England.


TR.Z
"TOMB" (MON.7)
TR.Y
DATUM 1 (1955)
PIT FOR MASSIVE OFFERING NO. 2
TR.X
TR.W
CORNER COLUMNS REMOVED FOR AIRSTRIP
TR.U
TR.T
PIT FOR MASSIVE OFFERING NO. 3
(CONCRETE POSTS ALONG EDGE OF AIRSTRIP)
TR.V
BASALT COLUMNS ENCLOSING COURT
BASALT COLUMNS ENCLOSING COURT
SITE CENTERLINE (8° WEST OF NORTH)
SOUTHWEST PLATFORM PIT
SOUTHEAST PLATFORM PIT
8° N
0 20 40 60
SCALE (FEET)
LA VENTA
TABASCO, MEXICO
COMPLEX A
LOCATION OF TRENCHES T—Z
EXCAVATED IN JULY, 1967.
(FOR DETAILED MAP OF COMPLEX A, SEE "DHS" 1955; FIG. 4.)

Map 1

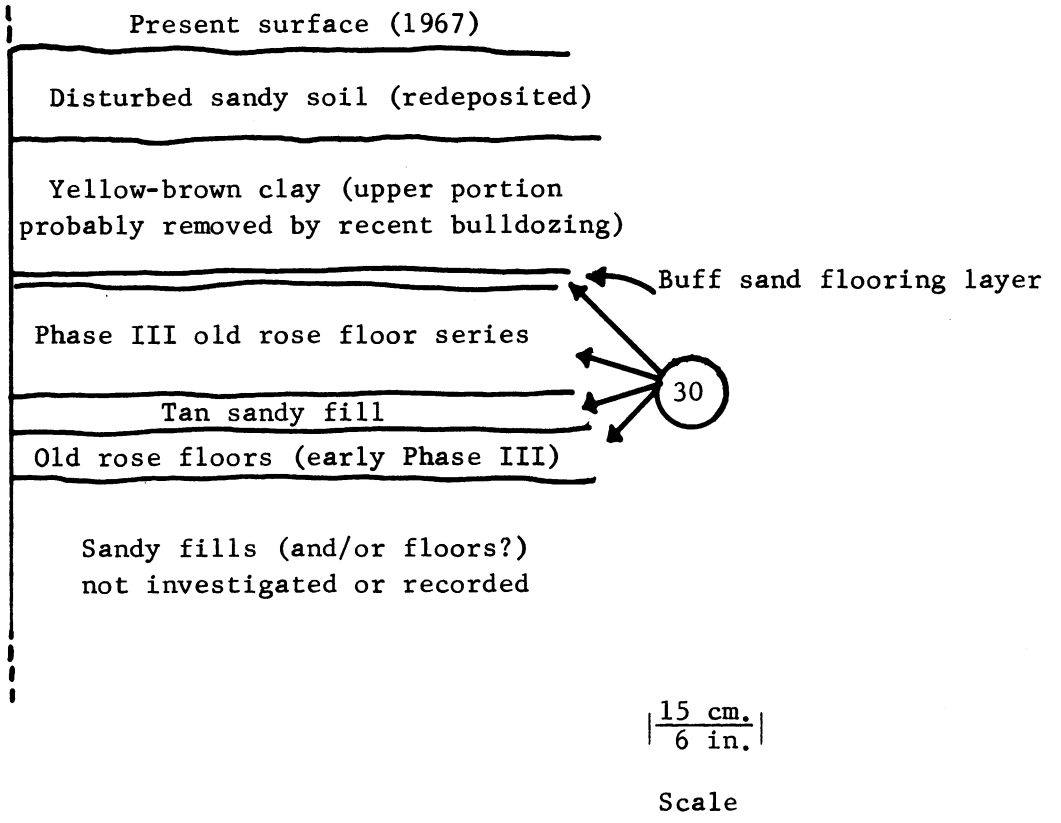


Fig. 1. Section showing north wall of Trench T. Location of carbon sample No. 30 shown.

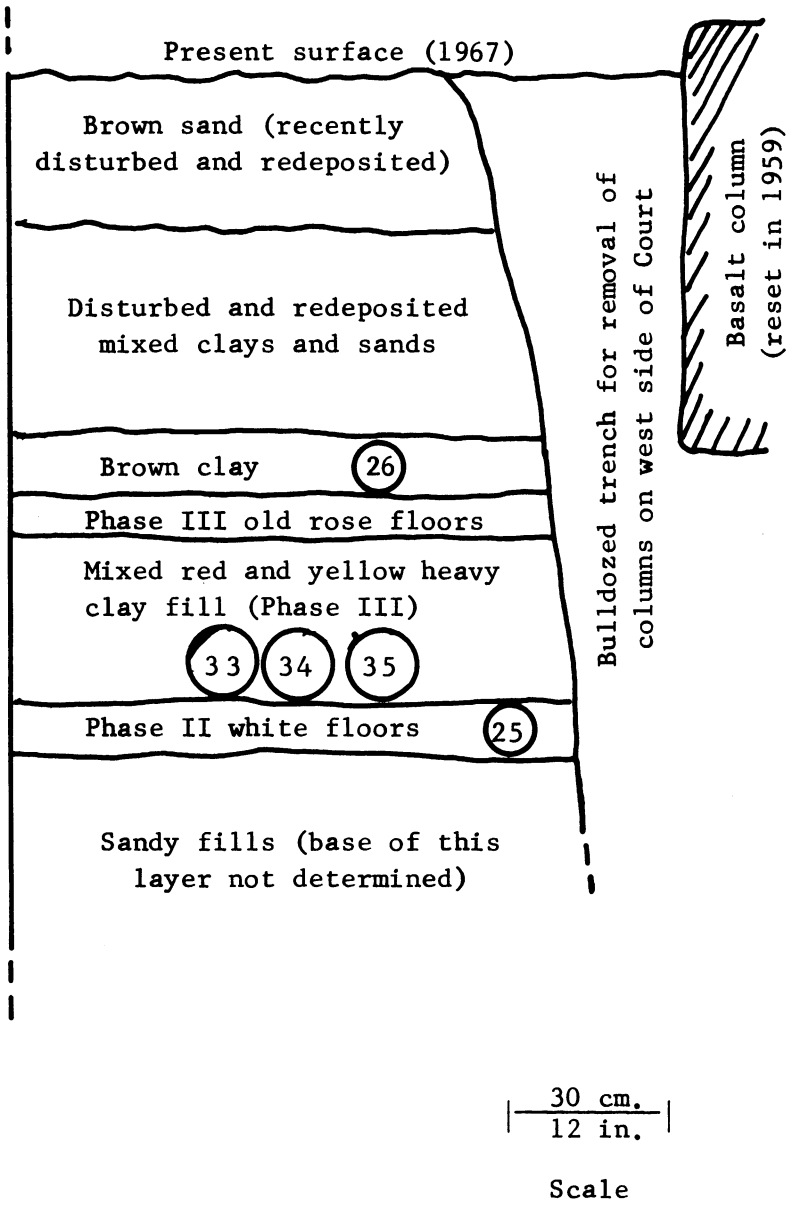


Fig. 2. Section showing south wall of Trench V. Carbon samples shown by circled numbers.

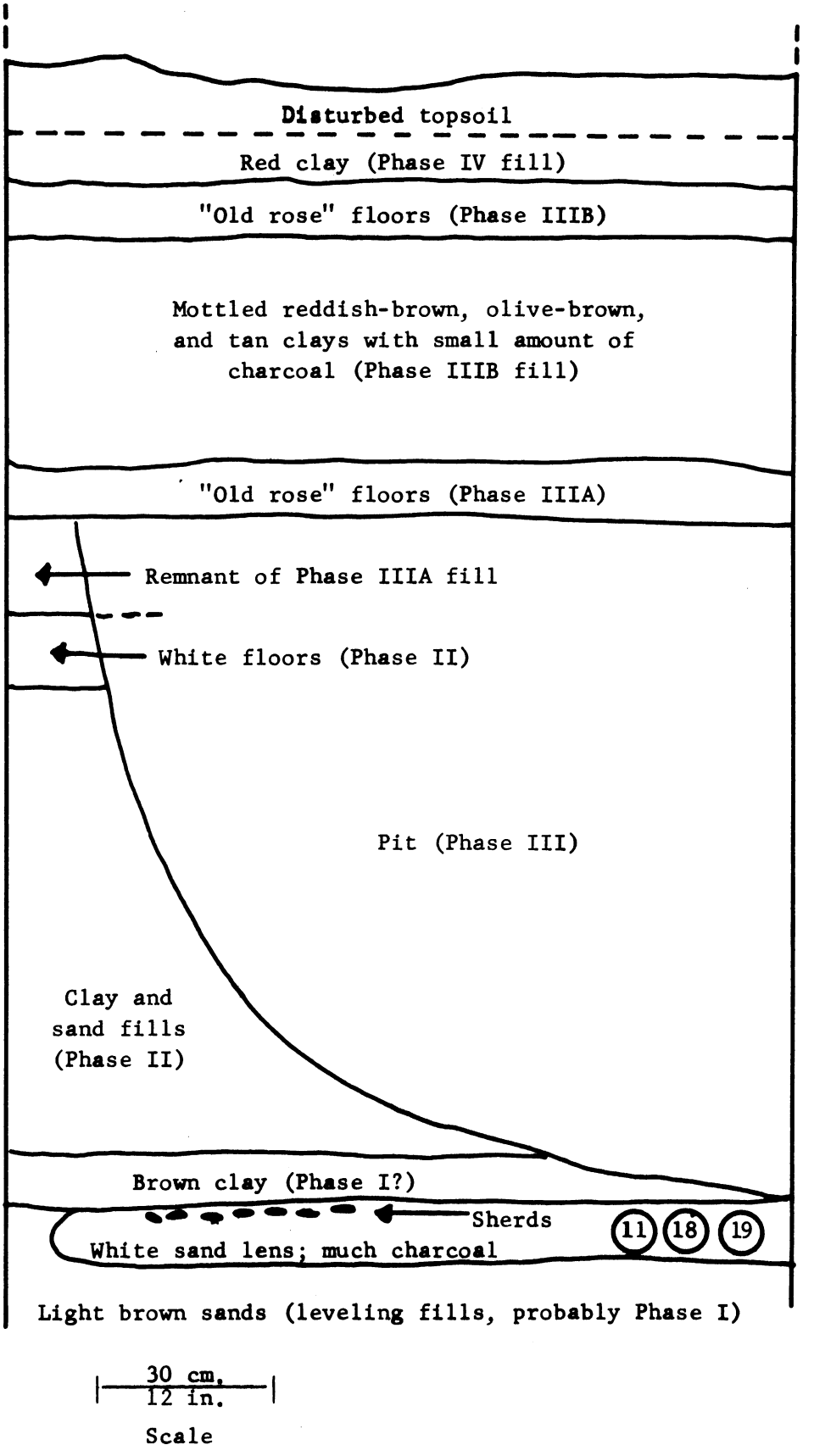
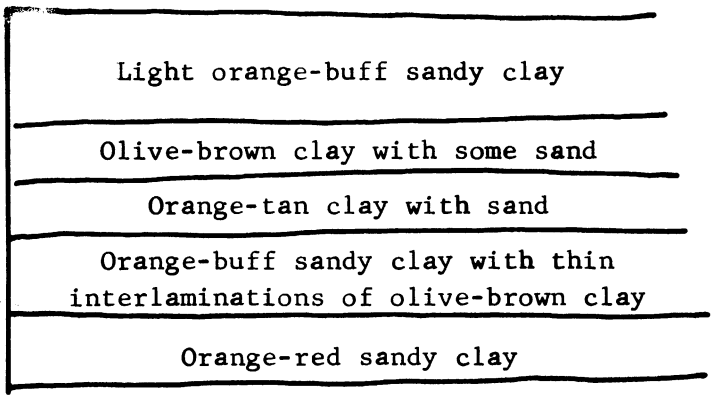
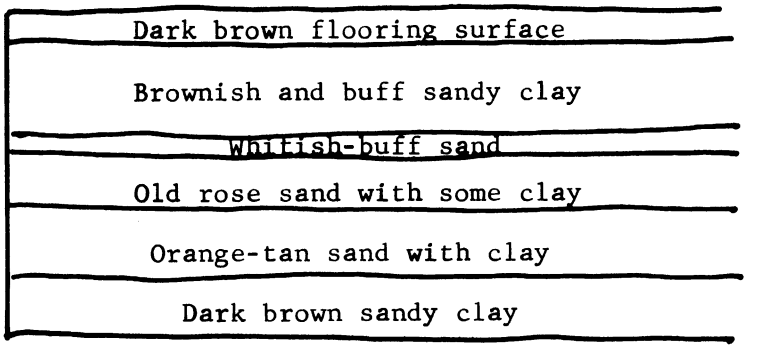


Fig. 3. Section at east end of Trench W



a



b

10 cm.
4 in.

Scale

Fig. 4. a. Detail of Phase IIIB floors, Trench W
b. Detail of Phase IIIA floors, Trench W

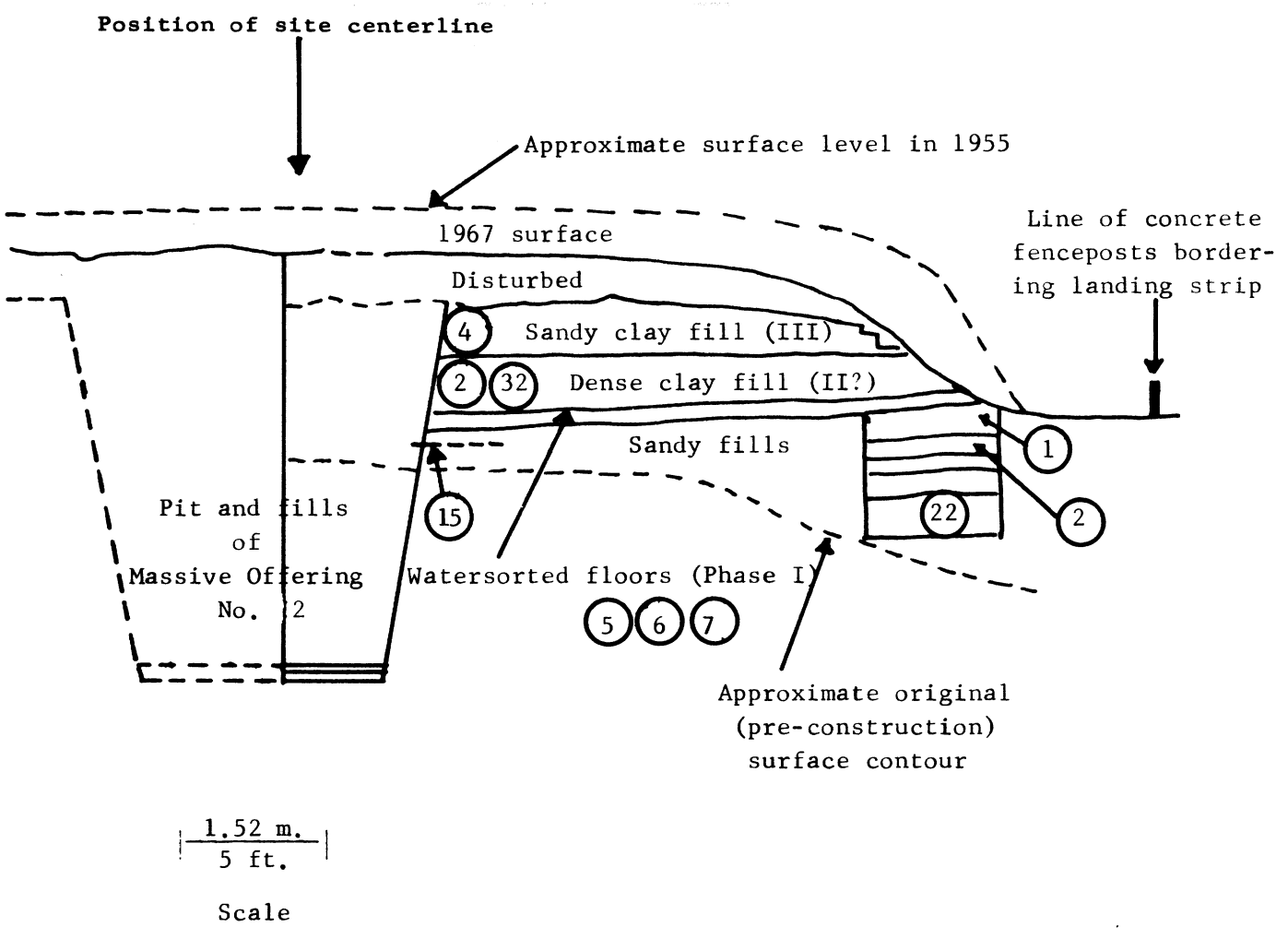


Fig. 5. Section of north wall of Trench X. Heavy line shows extent of excavation in 1967. Circled numbers are of charcoal samples collected for dating.

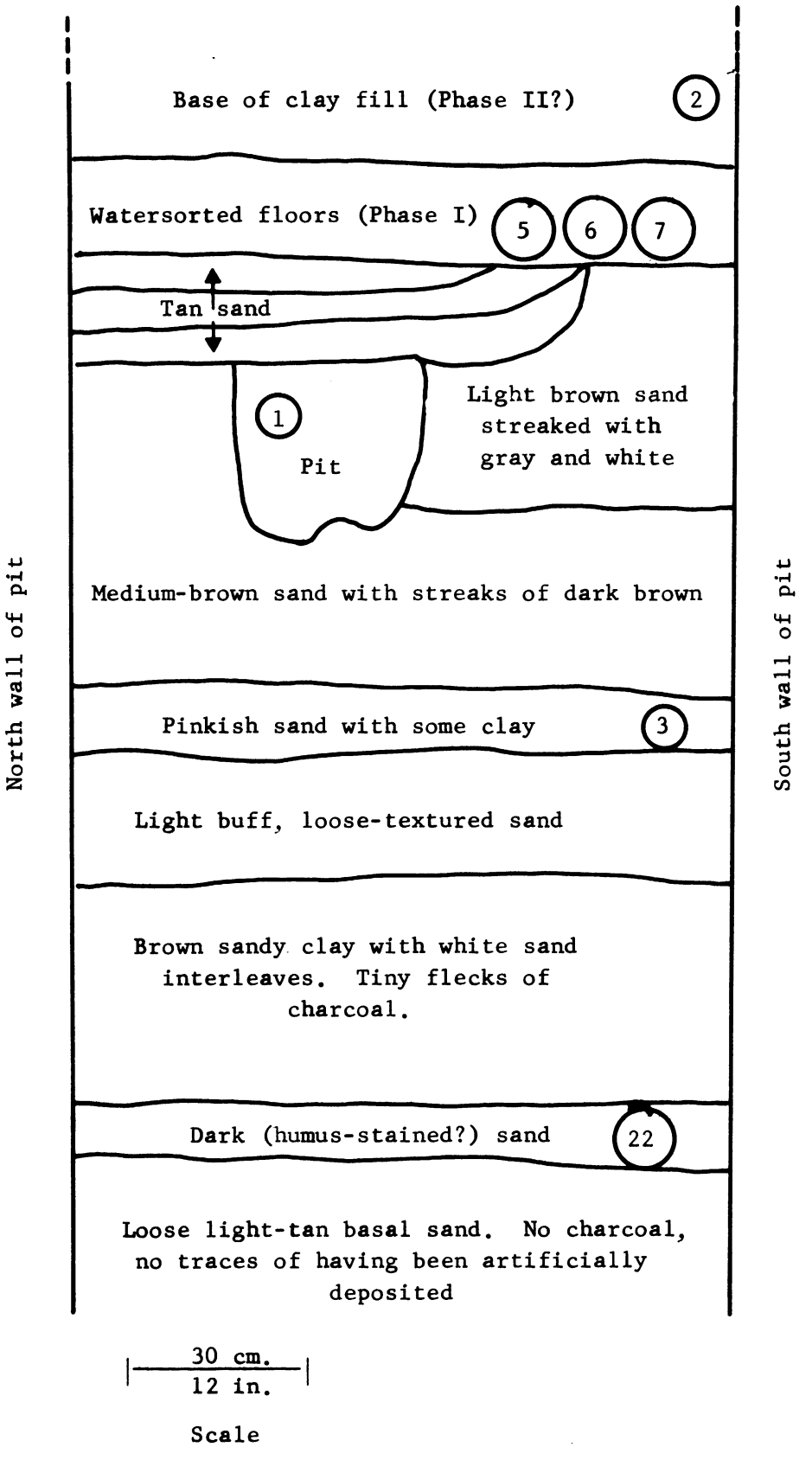


Fig. 6. Section toward west end of Trench X

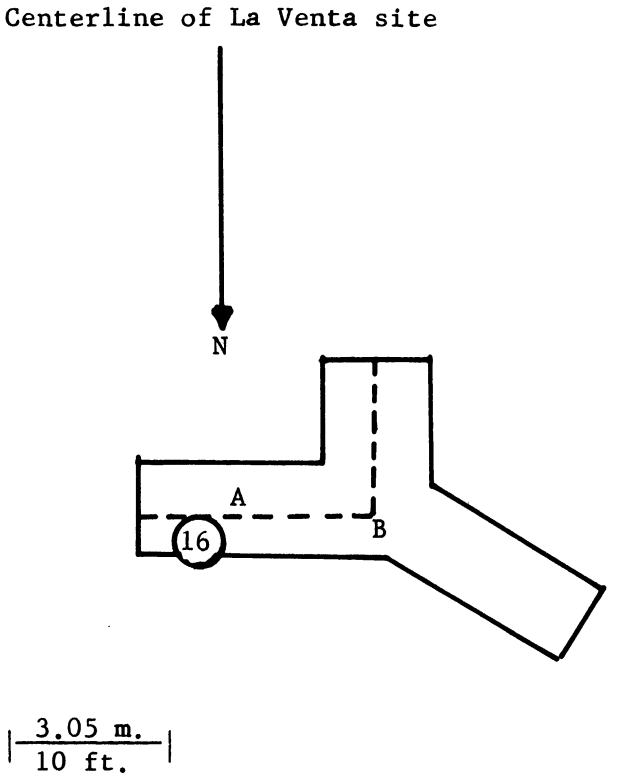


Fig. 7. Plan of Trench Y

A marks point where newly located Datum 1 of 1955 excavation occurs. This new datum is in the form of a basalt column buried upright. (16) marks location of carbon sample No. 16. Dotted line marks top of pit dug for Massive Offering No. 2.
B indicates northwest corner of Massive Offering No. 2 pit.

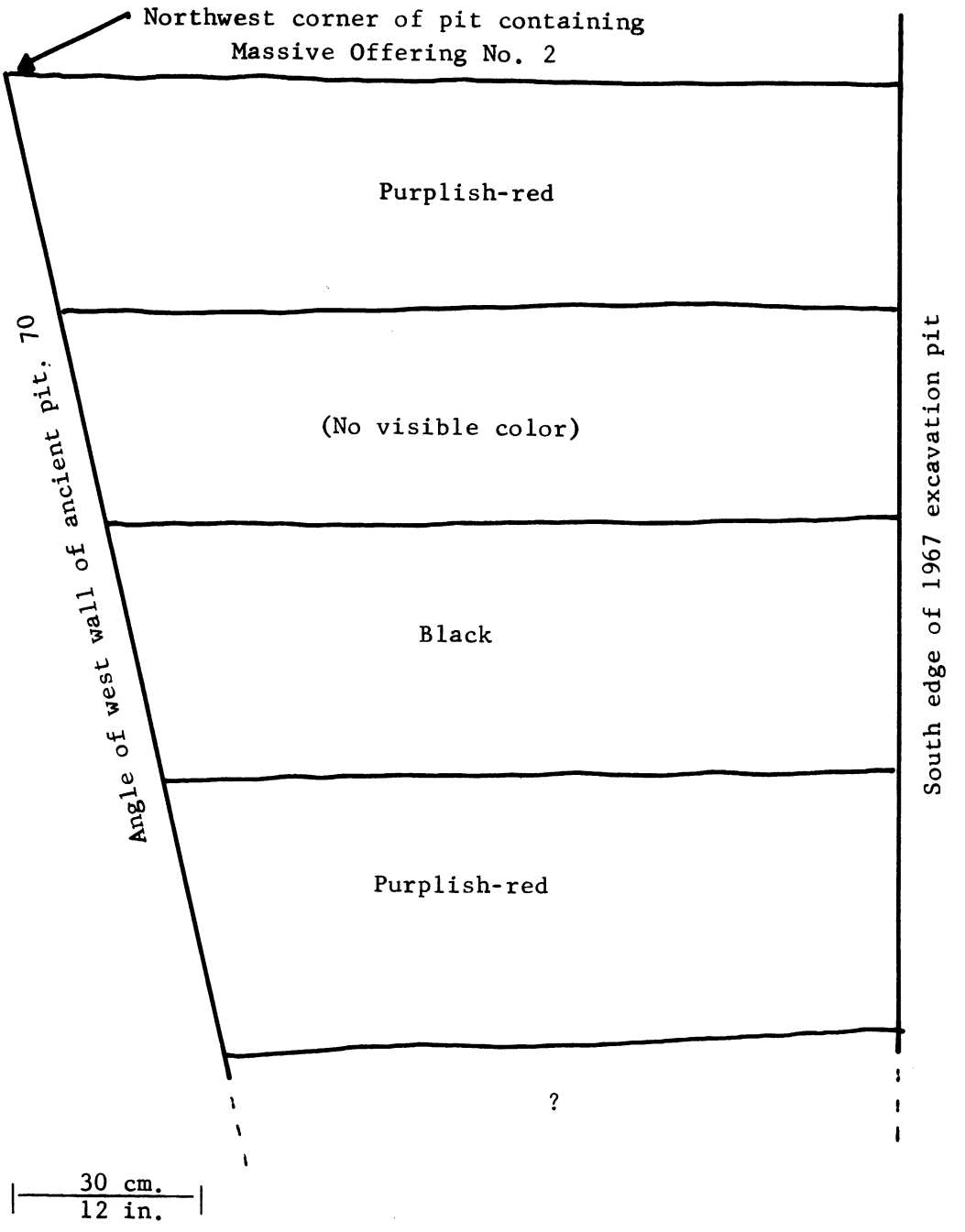


Fig. 8. Section of north wall of interior of pit containing Massive Offering No. 2, showing bands of surface coloration.

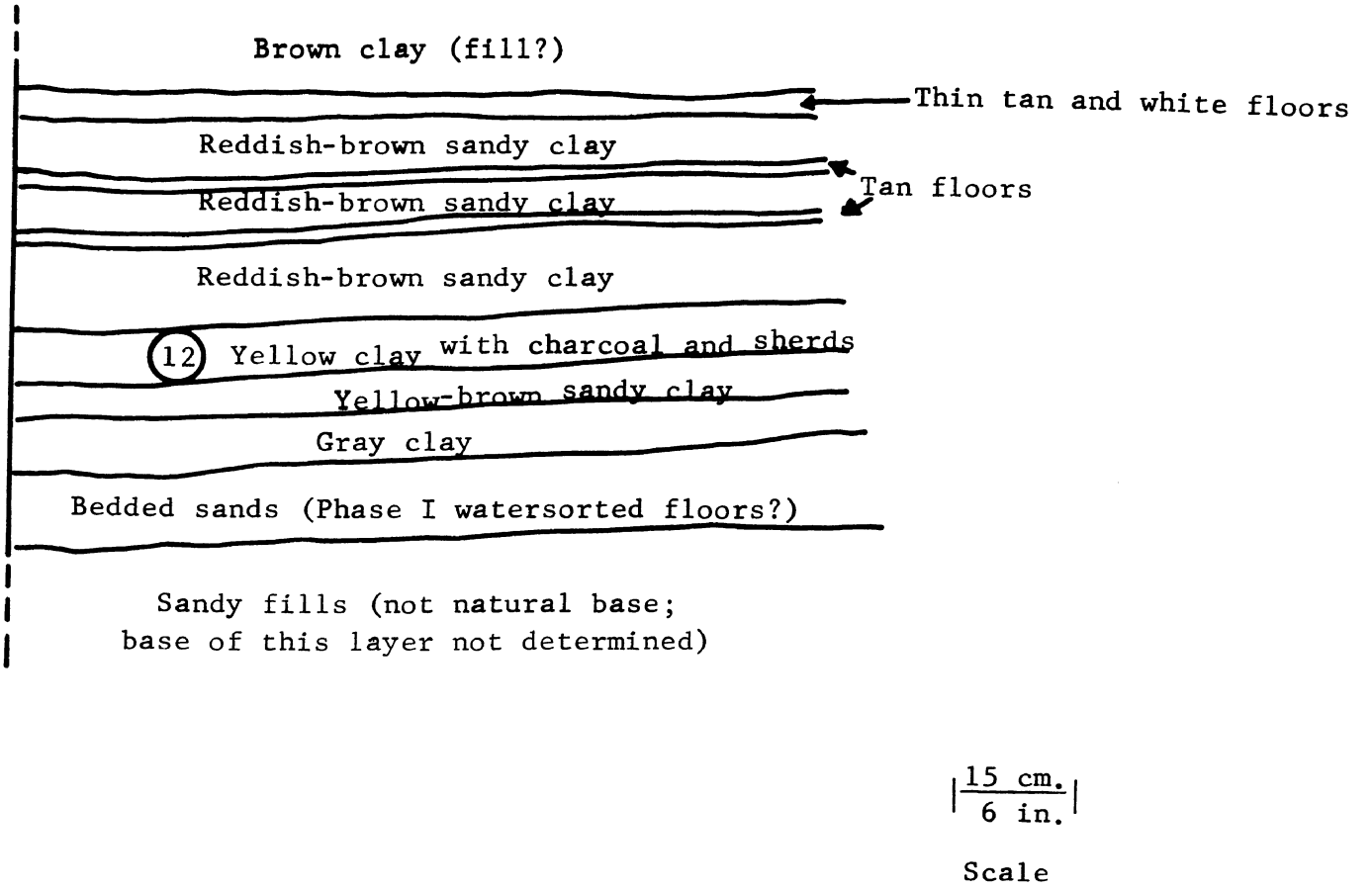
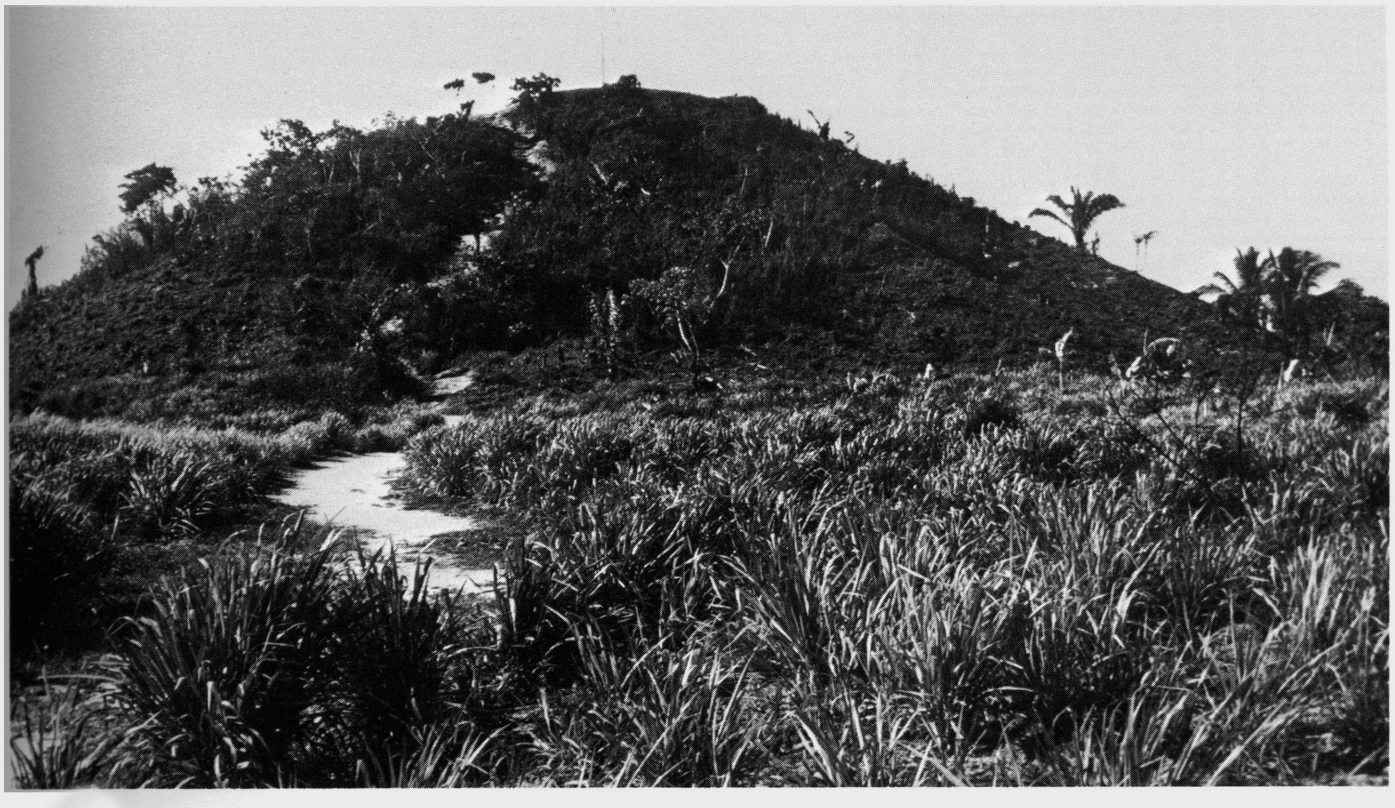


Fig. 9. East face of Trench Z

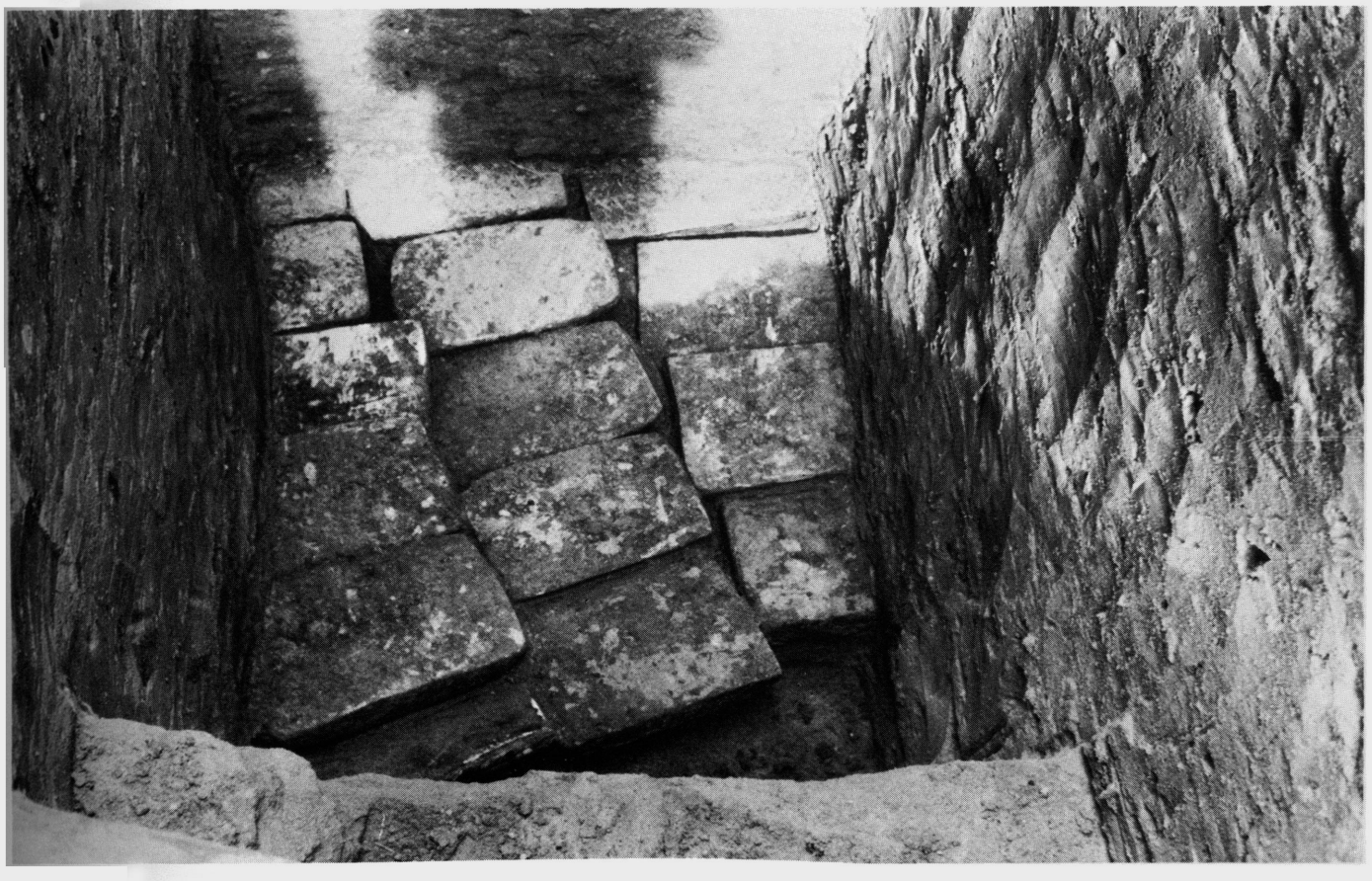
Plate 1

A. The La Venta pyramid in July, 1967, looking south along centerline from middle of Complex A. A "valley" on the west side an be clearly seen.

B. Exposed serpentine blocks of Massive Offering No. 2 in bottom of shaft at east end of Trench X.



A



B

Plate 2

A. Section toward west end of Trench X. Compare with Figure 6.

B. Section at east end of Trench W. Compare with Figure 3.

B

A

Plate 3

A. The pit line and fill of Massive Offering No. 2. Six-inch trowel lies on construction clays. The thin dark line to left of trowel is the painted surface of the pit interior (cf. fig. 8). Inside the pit (to left of painted line) is the pit fill in which can be seen broken painted flooring chunks town out during excavation of pit and thrown back in when pit was filled. (See also fig. 7.)

B. Photograph of east face of Trench Z, shown here to illustrate the regular, flat-lying nature of the La Venta Complex A layering. Top of pocket rule, which is extended to 24 inches, is in "brown clay (fill?)" just above the "thin, tan and white floors" shown in Figure 9.

A

B

II. THREE SANDSTONE MONUMENTS FROM LA VENTA ISLAND

M. W. Stirling

During the month of April, 1942, while conducting excavations at La Venta, we found a group of three large sandstone monuments approximately a quarter of a mile south of the long mound, on a sandy ridge near what was then the Blasillo trail. The two larger sculptures had fallen face down, while the third and smallest of the group was lying on its back, more or less face up. On the latter the carving had become somewhat eroded, although it was almost completely buried when we found it.

We excavated around all three monuments, tunneling under the two larger ones to determine whether the undersides had been carved. This was accomplished, but we did not clear them sufficiently to demonstrate the nature of the sculpture. Since the group may not properly belong to the main complex of La Venta, I have designated these monuments by letters.[1]

Monument "A" is in the form of a bust, resting on a flat bottom. The head and shoulders are depicted, with the arms across the chest. The upper part above the face is dome-shaped and probably represents a large headdress or helmet. This area constitutes about one-third of the length of the stone. I have apparently lost the measurements for Monument "A," but its proportions may be judged by the figure of the boy shown in the photo (pl. 1).

Monument "B" is 9 feet 9 inches long, 6 feet 2 inches wide, and 3 feet 4 inches thick (pl. 2).

Monument "C" is of huge proportions, being 12 feet 4 inches long, 6 feet 8 inches wide, and 4 feet 8 inches thick (pl. 3).

With no mechanical equipment available, the task of turning these sculptures over presented a rather formidable problem. As it happened, however, being occupied with other activities, we never did complete their excavation, and I did not publish them as I felt at the time that we should have more data.

---

[1] In 1968 all known La Venta sculptures were numbered. Monument "A" here is Monument 52, Monument "B" is Monument 53, and Monument "C" is Monument 54.

These sculptures present several interesting problems, and perhaps some day they may be properly studied. Being detached some distance from the heart of the La Venta ceremonial center, one wonders whether the monuments were contemporary with the carvings from the main site. The features on Monument "A," while not typical, appear to be Olmec in character; however, as a group they present a picture different from that of the carvings at the main site. Sandstone was used at La Venta, but rather sparingly. Monument 5, the sarcophagus, is the most outstanding example of this rock used in sculpture. Tomb "C," the cist, is also constructed of sandstone slabs, and there were a few minor examples scattered about the site.

There are sandstone outcroppings in the vicinity of La Venta, and it would not have been necessary to transport the stone for considerable distances, as was the case with basalt and other materials. Monument "C" is probably the heaviest stone monument on La Venta island, exceeding even Stela 3 in this respect.

Since the carving on the three monuments differs in style from that on the sculptures in the ceremonial center, it is a matter for speculation whether they are earlier in time. Excavations in the vicinity for sherds or other materials might determine this important point. Since the sculpture is primitive rather than degenerate, I am inclined to believe that it is early. It seems natural that in the beginning artists would have used sandstone, the only readily available material. Later, as they became more skilled, they would have imported basalt, the working of which, and its transport, would have presented an additional challenge.

Although I have had the photos of these monuments for twenty-five years without publishing them, it seems proper that their existence should be brought to the attention of archaeologists.

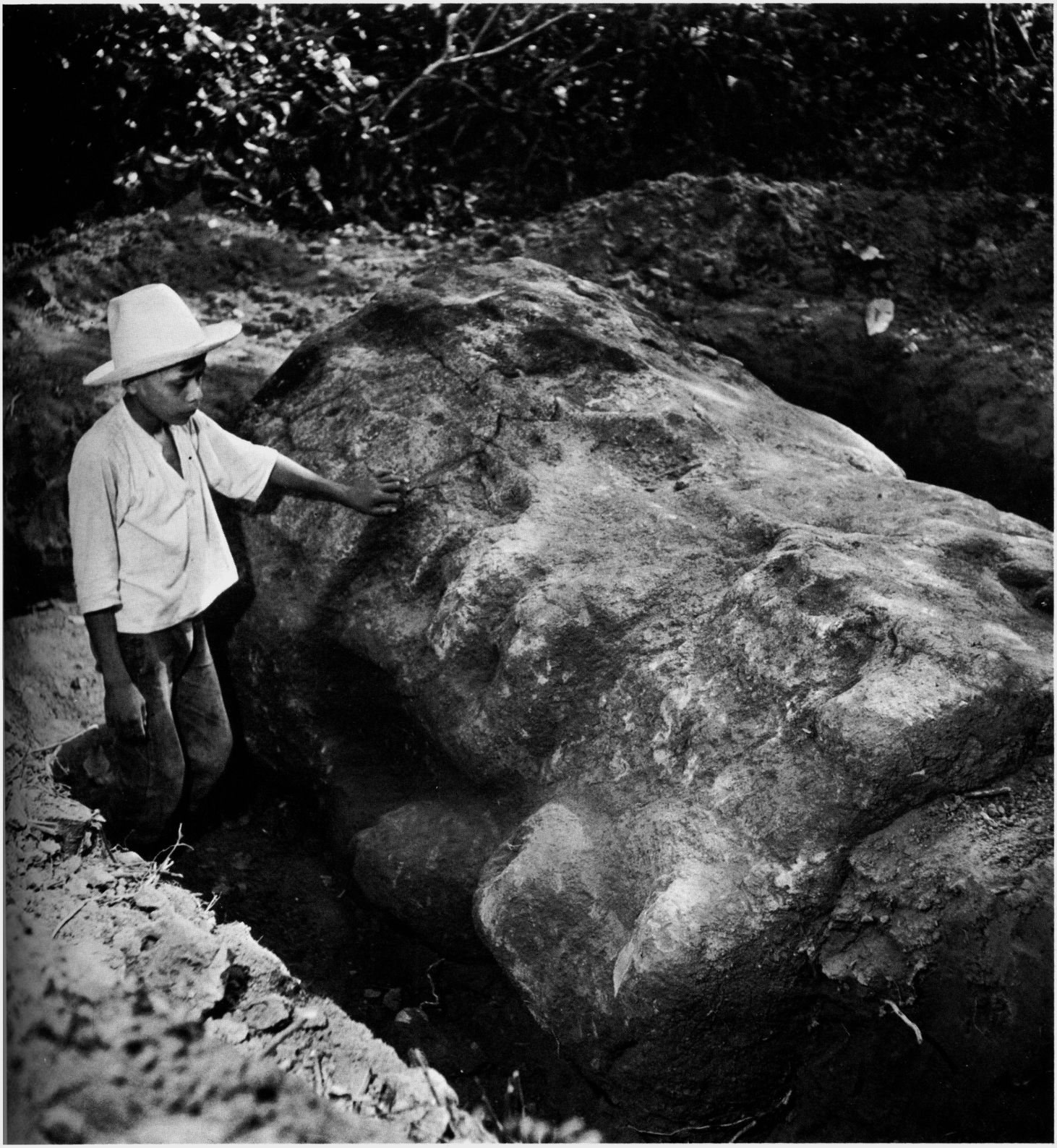


Plate 1. Monument "A"

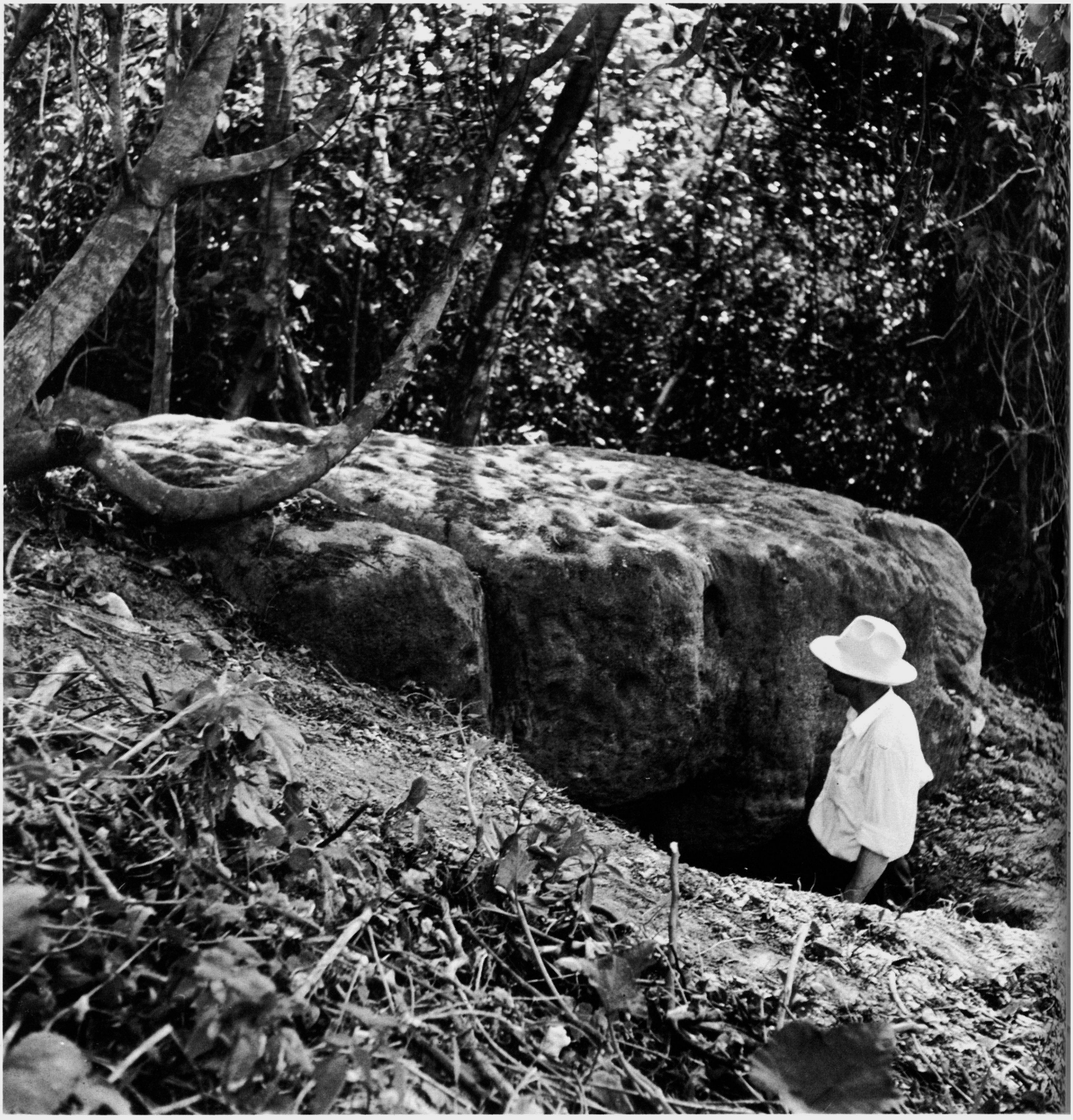


Plate 2. Monument "B"

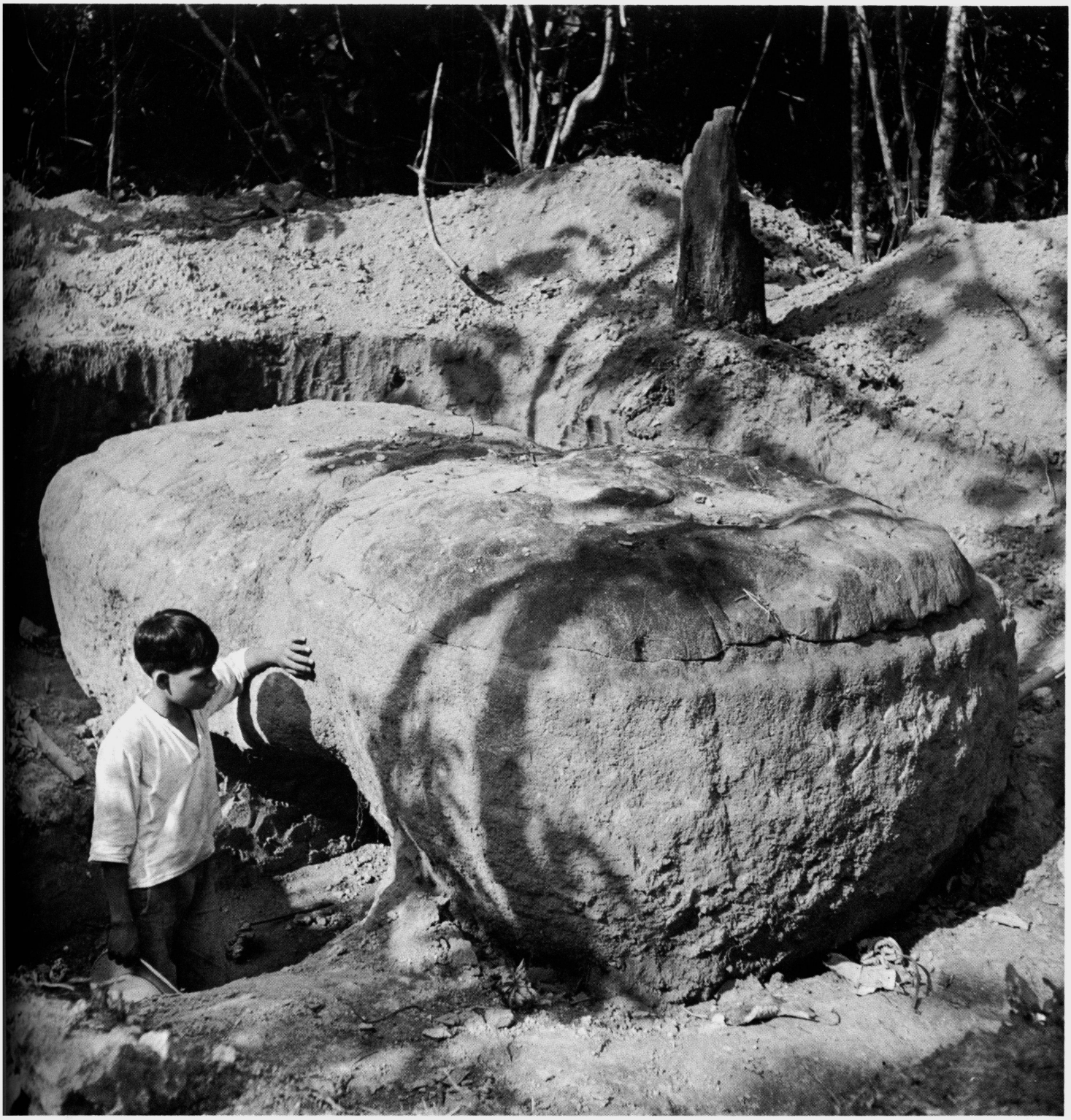


Plate 3. Monument "C"

III. THE EL MESÓN MONUMENT AT ANGEL R. CABADA, VERACRUZ

Philip Drucker

The large, ornately carved monument at El Mesón, Veracruz, Mexico, was first reported by Covarrubias (1957:241, fig. 68) who published a drawing of it. His drawing, however, contains numerous serious errors. For that reason this description and photograph of the monument are presented here.

Since the time that Corarrubias observed the monument and made his sketch, the official name of the town in which it is located has been changed from "El Mesón" to "Angel R. Cabada." (The community, it should be mentioned, is on the flat plain just north of the Tuxtla Mountains.) The monuments perhaps should be designated by the present name of the town in which it is situated; however, since it has been referred to in publications as the "El Mesón Monument" (or "Stela"), that nomenclature is retained here.

At the present time the stone has been set up to adorn the town park at the edge of the Veracruz - Coatzacoalcos highway. According to local information, it was found in or near a small mound group situated "about a kilometer" east or east-southeast of the present limits of the modern town. The discovery apparently was made in connection with excavating fill for the construction of the highway. Nearby, so it is reported, was another carved stone, a basalt column with a very damaged carving which has been described by Stirling (1943, pl.16a).

In all likelihood other students of Mesoamerican archaeology have seen the El Mesón monument, but as far as I know no photographs of it have been published. The probable reason for this is that it is extremely difficult to photograph. The relief is very low, and in addition the stone is set up tilted back slightly and from side to side is placed on an E-W azimuth that makes the sun, from mid-morning on, strike it directly enough as to obliterate all shading. Only with early morning light, and probably very late afternoon light, is it possible to get adequate photographs.

The monument (pl. 1) is made of El Vigía basalt of the type characterized by exceptionally coarse-grained olivine and augite phenocrysts (Williams and Heizer 1965:4, fig. 4). The object measures about 2.6 m. tall; its maximum width (which varies since one side curves convexly) is 1.7 m., and the thickness is 0.27 m. The top of the stone is irregular, not squared or trimmed evenly. At the present time, the base is encased in a block of concrete to sustain the monument in its position. My recollection, which

may or may not be worth much since it represents an attempt to conjure up a memory from 1955 when I saw the monument before the modern concrete base had been poured around it, is that the base is fairly square, side to side and front to back, so that the stone sat reasonably firmly on top of the ground, tilted back slightly against a couple of steel rails set in the ground behind it as braces. (My photographs taken in 1955 should have resolved this problem of the form of the base, but they were taken under a mid-day sun so I threw them away; they showed only an apparently featureless slab of rock speckled with phenocrysts.) A rough computation of volume (assuming a fairly square base) times the specific gravity of El Vigía basalt figures out to a weight of a bit over 2.5 metric tons.

The face of the block of stone had been ground flat, then cut away around the outlines of the figures to leave a low flat champlevé relief. This relief stands 2 to 4 mm. above the finished surface of the background. Within the figures themselves most ornaments and details are indicated by outlining with shallow incised lines; in a few places deeper, bolder carving defines interior details. While a great deal of detail still can be seen on the monument, some of it is lost or unclear, possibly through weathering or, if the stone lay worked-face down, through action of soil acids and perhaps of rootlets. The faces of the two figures appear to have been intentionally destroyed. That of the larger figure has been ground away very neatly, so that on looking at the monument one looks in vain for the features but at the same time sees no obvious traces of battering or pounding. The features of the smaller figure also seem to have been deliberately damaged; however, the abrupt, jagged, irregular edge where the face should be suggests that defacing may have been done by battering at the edge of the raised area.

The Decorative Field

On the face of the monument two figures are represented, one of which, centrally situated, is the larger - with more complex ornaments - and obviously the principal figure of the composition. It stands on a complex structure, or platform. This central personage is designated "Fig. 1" in the following description, and the feature on which it stands is referred to as the "Platform." The smaller figure, "Fig. 2", is to the (viewer's) right of Fig. 1 and appears to be seated just over an ornamental projection of the Platform. The effect is clearly that the figure is not actually meant to be shown as sitting on the Platform but somewhere beyond or behind it.

In studying the design, it was found that the photographic print, placed over a frosted glass and a fairly strong light, revealed some ornamental details that had not been noted in the unilluminated print. Tracings were made showing certain of these details (figs a through d). Both photograph and tracings should be observed during the following description and discussion.

Fig. 1 is presented standing, facing to the viewer's right. The posture is a non-perspective one (see fig. a): face (prior to destruction) apparently was in profile (since the headdress is in side view); shoulders full front view, hips three-quarters view; legs and feet in profile; feet pointing to the right (Posture I-A-1, Proskouriakoff 1950:19 ff.). The figure's right arm slopes downward and rearward (to viewer's left), the hand with fingers extended (not shown grasping realistically) holds an object with one end bifurcated and the other end obviously decorated. Just to the right of the hand an object which may be a tassel or possibly a blade seems to descend from the rod. A blade would of course indicate a weapon, in fact a hatchet-like one, but if we assume even a moderate amount of realism, the blade-like object seems to be at too great an angle from the "handle" to be an effective fighting tool. There is a suggestion of a row of small objects pendant from the lower margin of the object which, if certainly identified, would mean it is a tassel and not a blade. The left arm extends outward (to the viewer's right) in an awkward posture, holding in a cursorily represented hand a short baton from which dangles an unidentified object. This object is being pointed toward or offered to Fig. 2. The depiction of the human figure is done in a stiff, rigid manner, representative but without touches of realism: for example, the backs of the lower legs are shown by straight lines, not curves suggesting musculature.

As previously noted, the face of Fig. 1 has been destroyed, albeit in a neat, painstaking way, for traces of battering were removed presumably by careful grinding and/or hammer-dressing. The face must have been framed in the jaws of an open jaguar-saurian's mouth which forms the lower body of the headdress. An ear-spool is sharply defined in the proper place for a profile head so placed, and a chin-strap from the headdress is similarly placed.

From the area where the face was, or should have been, projects a form, defined by shallow incising, consisting of two double curved lines whose outer ends join to form a downward curving point. The form suggests a monstrous tongue, or even a flame, but without relief. The curves seem to be drawn much too regularly to be accidental. There is no recognizable similarity to the "speech scrolls" of Highland Mexican mural painting.

This figure was originally arrayed in an ornate dress and headdress. Unfortunately, much of the ornamental detail was in very fine line incising which has been damaged by weathering or action of soil and/or rootlet acids, so that in many places only remnants of lines that no longer join to form coherent patterns remain. Trying to trace the vestigial patterns was an exercise in frustration.

Of the various items of dress, the headdress is the best preserved. The basic portion is a version of the common Mesoamerican theme of the open-

mouthed animal or monster whose jaws frame the face of the wearer. However, this mask is double: a monstrous profile head that suggests a saurian holds in its jaws the space presumedly once occupied by the face of Fig. 1; the saurian in turn is combined with, or possibly protrudes from, the mouth of a very stylized jaguar (fig. b). In front of the jaguar's snout and above the saurian an object with serrated lower margin protrudes, in front of which a bunch of plumes extends horizontally. A rank of plumes is attached as well to the back of the jaguar head.

Surmounting the forehead of the jaguar is a tall element that curves forward and contains abundant traces of minute elaborate design in which one can almost "see" a series of faces and the like, which cannot really be made out (pl. 1). The leading edge of this element is irregular and adorned with various projections, including one simple scroll. The rear edge sweeps upward in a clean curve to an attachment near the top: an elongate object, rounded at the rear, with ten (or eleven?) small round objects - four (or five?) above, four below, and two at the rear - which project beyond the silhouette. The interior space contains a series of rectangular figures that suggest very strongly twilled checkerwork basketry, but which are not well enough preserved for certainty. At the very top of the forward-curving element, a set of six long plumes in three pairs - or three forked plumes - swirl forward in elegant curves. From behind the basketry-like element descends a long trailer of feathers - depicted in segments sloping at differing angles - which hangs to just below the figure's waist. The variation in the slant and length of the segments of the feathers gives this element a very realistic appearance.

The torso of the figure seems to be covered with a short cape, possibly of slipover type. On the figure's chest, overlying the cape, is a vertical column of elements that suggests a string of pendants suspended from the figure's neck. Slightly overlapping the lower edge of the cape is a horizontally elongate hexagon, within which tantalizing remnants of lines hint at a former complex pattern. The hexagon may have been the bottom element of the vertical string of pendants, but is not certainly so.

Seemingly from the left (viewer's right) shoulder dangles an object consisting, from top downward, of a round form, three narrow vertical elements, a round form, another round form, and three vertical elements (tassels? jinglers?). Vestiges of an identical series of elements appear to depend from the ear-spool behind the chin-strap of the headgear. It seems likely that a pair of ear-spool pendants was intended; if this is correct, considerable liberty was taken with the real position of the right-hand one in order to display it prominently. From the right (viewer's) lower edge of the cape hangs a tassel-like form: a round object with three danglers (or

feathers?). Over the figure's right thigh (left side to viewer) a vertical and a slanting bar and vestiges of a round form indicate a matching pendant or tassel.

A trapezoidal breechclout apron hangs from under the cape. Its lower edge is adorned with a row of six (five?) round forms (a string of beads?). At about the middle of the lower edge of the apron is an oval form; it cannot be determined whether this represents a pendant from the apron or is an ornament on the garter on the figure's left leg. Behind the figure, an unornamented strip, the rear trailer of the breechclout, dangles almost to the figure's heel. The figure's right upper leg (the one on the viewer's left) seems to be covered with a short kilt whose lower edge slopes upward toward the front, like the breechclout bordered on its lower margin by small round elements, with vestiges of fine lines that perhaps once formed a design.

Just below the kilt each of the angular legs wears a garter with a projecting ornament. The feet are shod in elaborate guaraches. On the right (rearward) foot a maze of lines seems to have once connected the sole to an ankle-band in a complicated lashing. Vestiges of lines on the forward (figure's left) foot suggest a similar lashing, but the eroded design is unclear. Flowing tassels, presumably of plumes, are attached over the toes of the footgear.

The Platform

The platform on which Fig. 1 stands consists of two vertical members capped by a double-headed Serpent (or Monster) bar (cf. Parsons 1967). The patterns interpreted as "Serpent (or Monster) heads" seem to contain the element termed by Parsons the "scroll eye." Above, and slightly to the rear, in each case is a long narrow channel that seems better positioned to represent an "eye." Both of these upper "eyes" seem to have been lengthened rearwards after the original design had been laid out. Elements that can be interpreted as plumed eyebrows are positioned directly over the original segments of these slit-like "eyes." At first glance the two Serpent (or Monster) heads give the impression of being mirror images of each other, but actually they are not: for example, the top of the central portion of the left-hand (viewer's) head is enclosed by two sharply defined angular scrolls whose upper edges level off to an almost straight line, while the right-hand element has only a "nose-scroll" which extends out beyond the line of the rest of the element. Details of small components of the two heads differ when compared closely (fig. c).

The vertical "supports" consist of two large decorated rectangles, each

flanked by a plain narrow bar. The decorated panels contain at their tops small matching figures, each terminating in a simple scroll. These figures vaguely suggest stylized Dragon or Serpent heads, but cannot be identified with certainty because of deterioration of detail; they may or may not have been precise mirror images. On the inner side of each figure, in a small area enclosed by narrow borders, is a boss or raised dot. Above, and apparently connecting the two small head-like figures, is an inverted U-shape formed by a strip of stone set off by both carving and incising, which Covarrubias (1957) interpreted as an Olmecan rendering of the frontal view of the upper jaw of a jaguar's (or Jaguar Monster's) open mouth. The angular hook or scroll breaking the continuity of the lower step of this suggested mouth symbol on the left, and the remnants of incised lines indicating a similar hook or scroll on the right, make this interpretation dubious. Similarly, weighing against the reading of the line as a Jaguar Monster's mouth is the fact that in purist Olmec depictions, and even in epigonal Olmec ones (e.g. the Tres Zapotes Stela 3 representation), the corners of the mouth do not carry extraneous appendages. A possible supporting factor for the reading of this melange of forms as a Jaguar Monster mouth consists in the irregularly sawed slits on either side of the inverted-U which perhaps might be considered the "eyes" of the Monster.

Under the preceding designs in the vertical supports of the Platform are two deeply engraved bands forming rectilinear six-sided scrolls, in approximate mirror relationship to each other.

Expecially noteworthy as referent to the Platform is the inferior craftsmanship of its carving - it was done carelessly or ineptly. This is most conspicuous when contrasted to the delicate, rigidly controlled workmanship of Fig. 1. The slits mentioned on either side of the inverted-U are a case in point: examination shows they were scratchily sawed out, are not the same size, nor are they quite level with each other. Also, the somewhat irregular line marking the under side of the inverted-U is an asymmetric obtuse angle; that is, the left side is at a lesser inclination from the horizontal than the right. The scrolls at the bases of the "supports" also show dissimilar handling. That on the left is sharply and cleanly cut, with nearly square corners; the right-hand figure has some sharp and some rounded-off edges, and the inner corners of the scroll are rounded off, not trimly squared. Asymmetry abounds in the presentation of the Platform, although areal patterns indicate mirror symmetry was the ideal for this sort of design. The differences between the upper portions of two Serpent (or Monster) profiles have been noted; these are not the result of damage for the outlines of the figures are clearly defined. The fang element on the underside of the left-hand head overlaps half the width of the plain vertical bar under it; that on the right just barely

intrudes on the corner of its bar. The raised bands surrounding the scrolls each include, on the outer vertical edge, a small, vertically oriented rectangle excavated into the raised border. These two small rectangles are not symmetrically placed but are at different levels. Finally, among the more obvious asymmetries, the right vertical support slopes inward notably as it ascends, so that the entire base of the Platform is quite out of square, being wider at the bottom than at the top.[1]

There is, of course, the possibility that some of these details, particularly those referred to as "scratchy" etc. may have been added to the carving at a later date - later, that is, than the completion of the original design. In such case, however, it would seem remarkable that such embellishments should have been restricted to the Platform, if they indeed represent a later reinterpretation of the design. It is assumed that if these technologically different treatments were made after completion of the first design, they had nothing to do with the demolition of the faces of Fig. 1 and Fig. 2. To associate modifications of design with destruction would suggest purposeless vandalism, not clarification of meaning and deliberate destruction.

Characterization of the handling of the representation of the Platform as a result of "carelessness" or "ineptitude" involves, of course, a value judgment. This evaluation derives from standards demonstrated in formal Mesoamerican sculpture, where cleanly defined straight or evenly curved lines, rather than irregular scratchy ones, were used for depiction, square corners were normal (even when corners were deliberately rounded the sides of the angles normally were at or very near to 90 degrees).[2] Precise mirror symmetry was usual in Mesoamerican sculpture in the representation of platforms, pedestals, framing devices, and other secondary patterns associated with the principal figure or figures of the monument.

---

[1] Note that the slope of the outer right components of the Platform supports in the photograph are not due to illusory photographic effects from the slight tilt of the stone in its present position; the angle of these components with any assumed vertical differs from the angle of the lines defining the components on the left.

[2] Right angles were used so commonly in Mesoamerican architecture, in facing stones, cornices, doorways, etc., as well as in sculpture, that one is justified in wondering whether some simple formula for erecting 90 degree angles (like our 3-4-5 rule) may not have been known and used for making try-squares for stone cutters, masons, and sculptors. The earliest Mesoamerican use of right angles known to me is to be seen in the neat three-dimensionally squared basalt blocks inset as ornamentation in the clay structures at La Venta (Drucker, Heizer and Squier 1959,pls.12-17), that cannot fail to suggest an attempt, in a region where all building stone had to be imported, to copy an effect of true masonry construction.

The remarkable contrast in craftsmanship between the treatment of Fig. 1, with its dynamic symmetry (discussed below), and the lopsided Platform, with its mixture of clean-cut and irregular lines, may be accounted for by one of the following hypotheses:

(1) The contrast was deliberately planned as an integral part of the design, with a specific symbolic significance.

Comment: The iconography of such a design would be completely beyond modern interpretation, the more so since it appears to be unique in Mesoamerican sculpture.

(2) The two parts of the sculpture were accomplished at different times or epochs, separated by a period during which esthetic standards changed.

Comment: While it is just possible that what I have called the scratchily-sawed components of the design may represent post-completion modifications or reworking, the basic design almost certainly represents a single unit temporally speaking. The uniform surface height of both Fig. 1 and the Platform above the cutaway surface of the monument indicates this, and the placing of the feet of Fig. 1, with their elaborate tassels, into the upper surface line of the Platform makes a separate history for each component of the final layout unlikely, if not impossible.

(3) The differential handling may indicate that two or more individuals or groups of individuals were encharged with the carving of different portions of the total design, and that in the case of this monument the competence of the carvers or groups of carvers differed.

Comment: One can but guess at the time factor involved in the carving of large monuments in tough basalts and andesites (probable and possible techniques utilized in sculpturing the Olmec colossal heads are given in Clewlow et al. (1967:63 ff.). It must have been a fearfully slow and laborious process. Given, however, the Mesoamerican achievement in organizing cooperative effort manifested in major constructions, moving of heavy weights, and the like, it does not seem unreasonable that the work of sculpture might have been parceled out, especially in the case of large monuments where there would be physical space enough for several artisans to work simultaneously. Heizer (1967:38) has discussed this possibility in connection with stylistic analysis of two La Venta monuments.

Fig. 2, the small figure on the (viewer's) right appears to be seated facing Fig. 1, holding up its right hand in a gesture that suggests rejection. The figure may, on the other hand, be offering some small object to

Fig. 1; the fingers in the Covarrubias sketch (1957) that emphasize "rejection" cannot be discerned on the stone or in the photograph. This figure has suffered a good deal of damage - in part as a result of natural processes, in part from ancient mutilation - so that one can see but vestiges of what seems to have been originally rather elaborate detail. As previously noted, this figure's facial features have been obliterated, apparently intentionally, in part by battering, then by grinding or hammer-dressing. The rear portion of the face remains, in distinction to Fig. 1. With only a moderate exercise of the imagaination, a jaguar headskin may be seen serving as a headdress, with a fleshless mandible (the Jaguar's?) protruding below the figure's face, and with the rest of the skin hanging cloak-like down the figure's back at the very edge of the pictorial field (simultaneously the edge of the stone). What seems to be a large square knot is incised on the lower portion of the figure. It cannot be determined whether this represents the tie of a wide belt or whether the figure is supposed to be lashed up (representing a captive). A three element (or fold) sash passes through a sort of grommet, or is tied slip-knot fashion, at the level of and to the rear of the square knot, its ends curving forward.

The first impression produced by Fig. 2 is that it is much simpler and more crudely drawn than Fig. 1. This may not be correct; it may be more damaged, with consequent loss of detail.

Composition

Implicit in any discussion of application of laws of esthetics to an art object is the assumption that specific application of such laws was accomplished deliberately, not accidentally. Whether done "intuitively," as some modern artists would have us believe is their method, or through painstaking planning, cannot be determined and is not significant for our purposes. What is important is that utilization of esthetic standards (whether more or less "successfully" in modern art jargon) denotes the existence of a value system in art; in other words, a cultural pattern. Heizer (1967) has verified the application of esthetic laws to two Olmec sculptures of unusually complex design for that period.

A minute analysis of the El Mesón monument is not attempted here; rather, certain of its more obvious features are discussed. One of these is the skillfully devised unequivocal direction of attention to the center of interest: the area enclosed by the outstretched hands of the two figures, specifically, the unidentifiable object(s) attached to the baton held out by Fig. 1, and perhaps the hand of Fig. 2 (fig. d). The outstretched arms of the two figures have this directional significance, of course; before the facial features were demolished they doubtless directed toward, though not at, the same area. A vector of the angle of the jaws of the saurian(?) mask

passes directly through the objects attached to the baton, although before the face of Fig. 1 was destroyed the direction of this line might have been slightly different. In addition, the swirl of the plumes at the top of the headdress produces a line of force that transects the focus of interest and is reinforced by the downward-pointing lower tip of the bunch of feathers at the front of the headdress. The tongue-like (or flame-like) projection from the mouth of the saurian(?) mask, if it was prominent when the design was new and clear, points to Fig. 2's hand rather than to the baton. Below, the conspicuous tassel on Fig. 1's leading foot produces an upward-pointing vector. Incidentally, all these directional devices also enclose a space to the (viewer's) right of Fig. 1 that balances the heavy mass of headdress and feather trailer behind (left of) the figure.

The Doubleheaded Serpent bar of the Platform, despite its asymmetric defects, produces the impression of symmetry and in treatment is compatible with the two figures. The vertical supports, with their bold angular design elements, are not compatible. They constitute bad composition: the heavy angular lines strongly distract the viewer's gaze from what was intended as the important area of the total pattern. That they do not completely disrupt the design's coherence seems to be due in part to the strength of the directional lines just discussed, plus an interest factor - the fact that representational forms tend to attract the viewer's interest more than simple geometric figures.

Comparative Materials

The first impression one receives of the El Mesón monument is that, stylistically, it is unique in Mesoamerican art. The relatively large open spaces of the background augment this impression. True enough, certain design units known from elsewhere in the area are included. The obtrusive angular scrolls of the platform in (more or less) mirror image are very like a pair forming a platform for a figure on a monument from Kaminaljuyu, as Miles (1965, fig. 14a, *passim*) has noted. The conventional Serpent (or Monster) profile masks are of long duration in Mesoamerican art, as Parsons (1967) has shown, whether or not they are all of the lineage of the Olmec Jaguar Monster representations. The persistence of the slightly more realistic jaguar motif, as in the headdress, over the millenia, is too well known to require documentation.

The principal human figure (Fig. 1), regarded without its confusion of ornaments, is the most useful portion of the design for comparative purposes. The posture - shoulders in front view, hips in three-quarters view, legs in profile - is similar to that designated by Proskouriakoff (1950:19 ff.) as I-A-1, and noted by her as frequently used on early Early Classic Mayan monuments.

However, distinguishing this figure from those of the Early Classic Maya tradition, and as well from Proto-Maya according to Parson's (1967: 184) classification, is the treatment of the figure: a notable rigidity, and departure from realism - lower legs indicated by straight lines, without curves suggesting musculature of the calves; left arm (on viewer's right) indicated in forced, unnatural position; hands diagrammatically rather than realistically depicted. This treatment is manifestly closely related to that of the human figures - out of proportion, neckless, angular - of the Initial Series stelae at Cerro de las Mesas (stelae 6,8,3; Stirling 1943). These in turn are closely related to the large figures of Teotihuacán murals (except that in the murals an attempt has been made to show shoulders in perspective). We have to do here with a very significant factor in the definition of an art style: what the artist's intent was, what he was trying to depict. Within certain limits this can be discerned objectively. The Mayan artists were attempting realistic presentations of the human figure, though with only moderate success until later in the development of their sculptural art - this despite additional interest in depiction of symbolic items, glyphs, and ornaments that fill so much of the space of Mayan pictorial fields. Similarly, the earlier Olmec artists stressed realism in representations of human beings. On the other hand, the designer of the El Mesón monument, like those of the Cerro de las Mesas stelae and the Teotihuacán murals, was interested in the human figure only as a sort of mannequin on which the symbolic elements could be displayed in the form of masks, headgear, articles of apparel, and accouterments. The most realistically carved portion of Fig. 1, in fact the only realistically depicted portion, is not the human form at all, but is rather the elegant feather trailer of the headdress with its changing curves and dip of sections of plumes coordinated with the varied outer edge to create a handsome rippling effect.

Similarly, what can still be seen of Fig. 2 suggests no particular interest in human anatomy. I have interpreted the figure as seated, mainly because no feet and legs are to be seen; the bottom of the figure is the widest part, as though it were supposed to have its legs tucked under, or perhaps was seated cross-legged. The carver patently had no interest in depicting the position of the legs. Nevertheless, the knot of the belt (or lashing?) and the pendant strips (or folds) of clothing are precisely shown.

Comparison to the Central Veracruz site of Cerro de las Mesas[3] suggests

---

[3] Cerro de las Mesas presents a basically Central Veracruz pattern affected by extremely strong Highland influences from Early Classic times. It is incorrectly referred to as Olmec in some comparative discussions by persons who do not bother to read the reports; they assume it was Olmec because Stirling investigated it. Actually, both Stirling and the present

further Central Veracruz comparisons. However, the most casual inspection suggests complete conceptual and stylistic difference between the composition treated here and the characteristic Central Veracruz art which Proskouriakoff (1954:65) characterizes as "marked by a rich interplay of ornament and theme, with no concentrated areas of design or voids in the compositions." The contrast, in the El Mesón specimen, between the elaborately decorated figures and the blank unadorned background area (at a rough estimate, more than a quarter but less than a third of the pictorial area) creates an effect poles apart from the busy, heavily loaded "baroque" Central Veracruz design.

Apart from stylistic considerations, a detail of material culture depicted on the monument and common in Central Veracruz sculpture can be noted: the combination of breechclout and short skirt or kilt. This seems, on consideration, to be a rather unusual dress style.[4] The combination, with kilts whose lower edge slopes upward to the front just as on the El Mesón stone, can be seen on a number of "palmas" (Proskouriakoff 1954, palmas 3,4, 6,7,9; numbers 5 and 10 show kilts combined with breechclouts with straight lower edges), in the Tajín panel reproduced by Proskouriakoff (op.cit. fig. 9-b, in which one personage wears a kilt with sloping, another with straight, edge, and two wear only breechclouts), as well as on the figure on the monument buried in Str. 5, Tajín (op.cit. fig. 9-a) and the Cerro de Moreno, Ver., stone (op.cit. fig. 9-f). A few clay figurines from La Venta also suggest such garb, though with straight, not sloping, edged kilts.

A number of the human figures on the palmas wear huge, apparently elaborate, feather headgear, but there is nothing reasonably like Fig. 1's headdress. As a matter of fact, I can find nothing comparable to the feathered trailer closer in time and space than the trailers of the late horse-culture Plains area – a comparison that manifestly can have no culture-historical significance whatsoever.

Slipover capes (strange garb for the hot coast plain; were they raincapes? or slavish copies of dress of the chill Highland?) are duplicated in clay figurines from Remojadas and Cerro de las Mesas (Medellín Z. 1960, pls. 38,39).

---

[3] writer have stressed its non-Olmec character, although noting traces of Olmec influence that filtered across the vast swampland between the lower Papaloápam and the Rió Blanco, or were transmitted by routes flanking this barrier.

[4] By exercise of great restraint, I have desisted from making captious comparison to simultaneous use of belt and suspenders in our modern wearing apparel complex.

Temporal Position

Bereft of archaeological context, content and stylistic features offer the only means for relating the monument to a specific time horizon. Both Miles (1965:255) and Parsons (1967:182) refer the specimen to Pre-Classic epochs, but it must be remembered that they had only Covarrubias' sketch on which to base their opinions; a sketch that gives the design an Olmec or Olmecoid flavor quite lacking in the actual design. Although the monument was found not far from the northern slopes of the Tuxtla Mountains, within what was once the Olmec heartland, and although it is made of the same material as many of the Olmec and Olmecoid monuments of Tres Zapotes and Nestepe, it is completely lacking in Olmec stylistic traits.

If we accept the hypothesis that the "Serpent or Dragon heads" are properly identified, and further, that this motif is, as Parsons, Covarrubias and others have proposed, a lineal descendant of the Olmec Jaguar Monster wherever found, and in addition, if we assume that the so-called "scroll eyes" and the rectangular slits above them are properly read as "eyes" and are parts of the original layout, we have a clean-cut indication of conceptual change. (This is, of course, piling an Ossa of hypothesis on a Pelion of conjecture to squeeze out a wisp of chronology, but the fact is we have little precise data to work with.) Making all the foregoing assumptions leads to the conclusion that the symbolism of the scroll eyes as eyes had been lost by the time this monument was designed. (Interestingly, the Serpent or Dragon head on the Bilbao monument [Parsons 1967] seems to have two scroll eyes; reading the upper one as right, the head "faces" to the right, and vice versa.)

Nor do items of content help us much. The *somewhat* unique breechclout-kilt combination is interesting but seems to have little precise time significance. Proskouriakoff argues convincingly for a Late Classic (and late Late Classic at that) date for the palmas and for the Tajín ball court panels. She judges the figure similarly garbed on the buried Tajín monument to be earlier on stylistic grounds, an appraisal substantiated by its stratigraphically earlier origin. Hence we have a time span that includes both Early and Late Classic. If the La Venta figurines really represent a comparable dress style, we have to do with a tremendous time span. Just because we are accustomed to thinking of dress styles in our culture as subject to constant and rapid change does not mean those of other cultures may not be stable.

The slipover cape associated with the handmade plus appliqué figurines with triangular Teotihuacanoid faces are surely of Early Classic date and may provide a somewhat better time marker. However, it is not certain that this trait did not persist into later periods.

Of all the recognizably distinctive characters of the El Mesón monument, that relating to the treatment of the human figure in relation to the presumably symbolic appurtenances is probably the surest guide to temporal placing: it plainly points to strong Teotihuacán influence of Early Classic date. Consequently, an Early Classic origin of the monument seems most likely.

References

Clewlow, C. W., Jr., R. A. Cowan, J. F. O'Connell and C. Benemann
1967 Colossal Heads of the Olmec Culture. Univ. Calif. Archaeol. Res. Facility, Contributions, No. 4, Berkeley.

Covarrubias, M.
1957 Indian Art of Mexico and Central America. New York: A. Knopf.

Drucker, P., R. F. Heizer and R. J. Squier
1959 Excavations at La Venta, Tabasco, 1955. Bur. Amer. Ethnol. Bull. 170, Washington, D.C.

Heizer, R. F.
1967 Analysis of Two Low Relief Sculptures from La Venta. Univ. Calif. Archaeol. Res. Facility, Contributions, No. 3:25-56, Berkeley.

Medellín Zenil, Alfonso
1960 Cerámicas del Totonacapan. Xalapa, Ver.

Miles, S. W.
1965 Sculpture of the Guatemala-Chiapas Highlands.... Handbook Middle American Indians 2:237-275. Univ. Texas Press, Austin.

Parsons, L. A.
1967 An Early Maya Stela on the Pacific Coast of Guatemala. Estudios de Cultura Maya 6:171-198, Mexico City.

Proskouriakoff, Tatiana
1950 A Study of Maya Sculpture. Carnegie Institute of Washington, Publication 595, Washington, D.C.

1954 Varieties of Classic Central Veracruz Sculpture. Ibid., Contrib. to Amer. Anthro. and Hist., XII: 58. Washington, D.C.

Stirling, M. W.
1943 Stone Monuments of Southern Mexico. Bur. Amer. Ethnol. Bull. 138, Washington, D.C.

Williams, H. and R. F. Heizer
1965 Sources of Stones Used in Prehistoric Mesoamerican Sites. Univ. Calif. Archaeol. Res. Facility, Contributions, No. 1:1-40, Berkeley.

Plate 1

Fig. a. Human figure portion of Fig. 1

Fig. b. Jaguar-Saurian (?) portion of Fig. 1 headdress

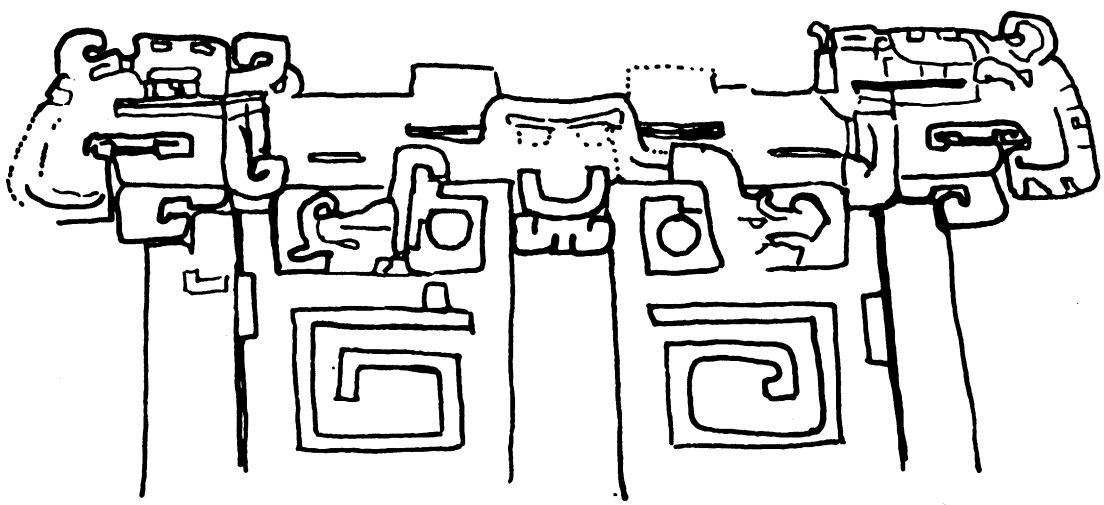


Fig. c. Detail of Platform

Fig. d. Directional lines to area of interest

IV. ANALYSIS OF AMERICAN OBSIDIANS BY X-RAY FLUORESCENCE AND NEUTRON ACTIVATION ANALYSIS

F. H. Stross,* J. R. Weaver,* G. E. A. Wyld,* R. F. Heizer,† J. A. Graham†

In recent years several studies have been published that were aimed at characterizing obsidian by analyzing for elements present in small or trace quantities. If obsidian rock can thus be characterized according to source, correlation of an obsidian artifact with its source becomes possible. Mediterranean and Afro-Asian obsidians have been studied by Castiglioni et al. (1963), Cann and Renfrew (1964), Renfrew, Cann and Dixon (1965), Renfrew, Dixon and Cann (1966), and Dixon, Cann and Renfrew (1968). Green, Brooks and Reeves (1967) have studied New Zealand obsidian types by emission spectroscopy. A similar though smaller study of American obsidians has been published by Weaver and Stross (1965) and Heizer, Williams and Graham (1965). The present paper is a continuation of the two latter studies.

Experimental

The samples reported here were analyzed by x-ray fluorescence using the same instrument and technique described in the earlier study (Weaver and Stross 1965). Values for the nine samples (with a few minor corrections) together with an additional fifty-seven samples analyzed in 1965 are shown in Table 1. The sample descriptions are given in Table 2. In addition to the analyses made by x-ray fluorescence, manganese was determined by neutron activation analysis. The x-ray values are in terms of counts-per-second-over-background and have no absolute quantitative significance; the manganese values are given in terms of parts per million by weight.

Aluminum, chromium, and manganese have been disregarded in the x-ray fluorescence determination. These can normally be measured, but they were judged to be of no value in this study for the following reasons: (1) the grinding device used to powder the samples was made of alumina and the samples were unquestionably contaminated with aluminum by the grinding operation; (2) the x-ray tube used had a chromium target which resulted in a very large background signal for chromium; (3) the small manganese peak,

---

* Shell Development Company, Emeryville, California.
† Department of Anthropology, University of California, Berkeley.

We wish to thank Shell Development Company for the time and facilities made available to us for this study (P-1639). We also thank Mr. J. Holst, who carried out most of the x-ray fluorescence analyses.

while detectable, was on the side of the large chromium peak, and hence measurement was unreliable. However, manganese is considered a good diagnostic element in this connection, and therefore we employed another technique for obtaining this analysis.

The x-ray fluorescence work was performed over an extended period of time, and it was necessary to adjust the conditions each time a lot of samples was analyzed to make all the data comparable with each other. Subsequent to the first lot, each time the instrument was used it was adjusted to give, as closely as possible, the same counts-per-second for each element in an arbitrarily chosen sample, namely sample 1-9. We include the data obtained on that sample at several points in Table 1 to illustrate the precision that was obtained in this process.

For the neutron activation determination of manganese, 20-mg samples were irradiated for 30 minutes in a thermal neutron flux of 10^{11} neutrons/cm^2/sec. in the Aerojet-General Nucleonics Industrial Reactor in San Ramon, California. Ten micrograms of gold was added to each sample and standard as an internal standard to compensate for flux variations. Gamma-ray spectra were recorded by means of a solid, 3-inch sodium iodide detector and a Nuclear Data, 512-channel analyzer. The only interference under these irradiation conditions was sodium. A computer program was used to remove the sodium interference by means of differences in the gamma-ray spectra and half-lives.

Results

Artifacts from Mexico, Guatemala, Honduras, and some from California and Nevada were analyzed. It has been suggested by Parks and Tieh (1966) that the strontium/rubidium ratio is characteristic of origin and age of the rock and could give an indication of its provenience. Among the other elements that showed the largest variation, the most useful for diagnostic purposes were considered to be zirconium, manganese, and iron. Data for these elements are displayed in a bar-graph (fig. 1) and in two ternary plots (Zr-Sr-Rb and Sr-Rb-Mn, figs. 2 and 3).

The graph and plots bring out the fact that the samples seem to fall into three groups:

Group "O", which comprises the greater part of source and site samples, is the group that clusters around the center of both of the ternary plots, and is characterized by approximately equal relative amounts of strontium, rubidium, zirconium, and manganese. This group, we believe, is inadequately differentiated; that is, there are probably several source types which are sufficiently similar to be included in this general group. On logical

grounds, the El Chayal and Ixtepeque (=Papalhuapa) sources in Guatemala may be suggested as providing the obsidian for most of the Maya site artifacts analyzed here (samples 1-5, 2-4 / 2-9, 2-14 / 2-19, 2-23 / 2-30, 2-32 / 2-48), and in addition, the Salvador sample (2-11) and those from Copán, Honduras (1-5, 1-13, 3-4). Stephens (1963:II:232), in the early eighteen-forties', may have been correct when he described a pottery jar from Kantunile, Yucatan, as "filled nearly to the top with arrow-heads, not of flint, but of obsidian; and as there are no volcanoes in Yucatan from which obsidian can be procured, the discovery of these proves intercourse with the volcanic regions of Mexico." The Otumba, Mexico, source (samples 2-20, 3-5A, 3-5B) probably provided the material for artifacts (2-21, 2-33) from Teotihuacán. The La Venta samples (2-1, 2-2) may have been derived from either the Guatemala highland, the Mexican highlands, or some as yet unknown source. The intermediate geographical position of La Venta, vis-à-vis Guatemala and Hidalgo, makes any guess based upon geographical proximity impossible. Only further artifact and source collecting and analysis will provide the data to differentiate Group O.

Group "2" is distinguished by a very low value for strontium, a high Zr/Rb ratio (4 to 6), and a high value for manganese. This group includes all "green" obsidians in the collection of samples analyzed. The only Mexican source represented in this group is the Pachuca quarry, Hildalgo (samples 1-3, 3-6A, 3-6B), which is well known for its green obsidian deposit and is thought to have supplied the raw material for most, perhaps all, of the green artifacts found in Mesoamerica. Sample 1-7 is a surface artifact from the La Venta site, and its age is therefore not determinable. In January-February 1968, excavations at La Venta in La Venta period refuse deposits yielded a number of obsidian blades of green color, and these may be presumed to have come from the Pachuca source. Drucker (1952:145) observed that he found no green obsidian in the test pits and trenches dug by him in 1942. It can now be said that the green obsidian from Pachuca was being traded as far south as La Venta in Middle Pre-Classic times, and as far as the Petén and highland Guatemala in Early Classic times.

It is remarkable that a blade found in Lovelock Cave, Nevada (sample 2-49) gave values that placed it clearly in Group 2; this specimen also seemed to have the greenish translucency that is characteristic of the Pachuca deposit. It is highly improbable that this artifact should have been traded the long distance from Pachuca to Lovelock, and consequently this finding is of special interest. The Department of Anthropology at Berkeley provided additional specimens (arrow points) of green obsidian which had been found at sites near Lovelock Cave. Eleven of these were analyzed and, without exception, gave analytical results that were consistent with the unusual analysis found for the first artifact. These analyses were compared with those obtained by the University of California (Berkeley)

Department of Geology (R. Jack, personal communication) for California and Nevada artifacts and sources. These included a few artifacts from Buckbrush Springs, Humboldt County, Nevada, which gave analyses similar to our Lovelock analyses. Since these two sites are not a great distance apart (about 65 airline miles), a common source of the obsidian is suggested. No deposit with the characteristic composition is now known, and it will be of interest to find the source from which the Lovelock Cave-Buckbrush Springs type green obsidian was obtained.

The remaining samples have been classed separately and are designated Group "1". They have in common a low strontium content and a much lower Zr/Rb ratio (approximately 1). The samples indeed appear as a generally homogeneous group in the ternary plot (Zr-Sr-Rb, fig. 2). This group includes the two samples from Napa County, California. Many obsidian samples from the same region have been analyzed independently by the Department of Geology (Jack, Le Joie and Carmichael 1967), and were found to give values on the Zr-Sr-Rb plot similar to those obtained on our samples. The latter, however, were further analyzed for manganese, and are distinguished by their very low manganese content, as is evident in Figures 1 and 3. Only one Mesoamerican sample (2-47, an artifact from Chichén Itzá) exhibits a similarly low manganese content. We have called this subgroup "1A." Here again, as in the Group 0 series, there must be at least two sources represented – one Californian and one Mesoamerican.

Four other Mesoamerican samples of Group 1 (samples 3-1, 3-2, 3-3, 2-10) have a manganese content intermediate between subgroup 1-A and most of Group 0, and are classed as subgroup 1-B. All of the subgroup 1-B samples date from the Pre-Classic. The source of the artifact material is not known, but we would guess that it will be found to exist in the Central Mexican highland. If there are two sources, one of which supplied Cuicuilco and the other southern Veracruz, both remain to be located.

The iron content generally varies with the groups (Group 0 has the lowest, Group 2 the highest iron content), but this does not seem, at least at the present time, to offer additional insight.

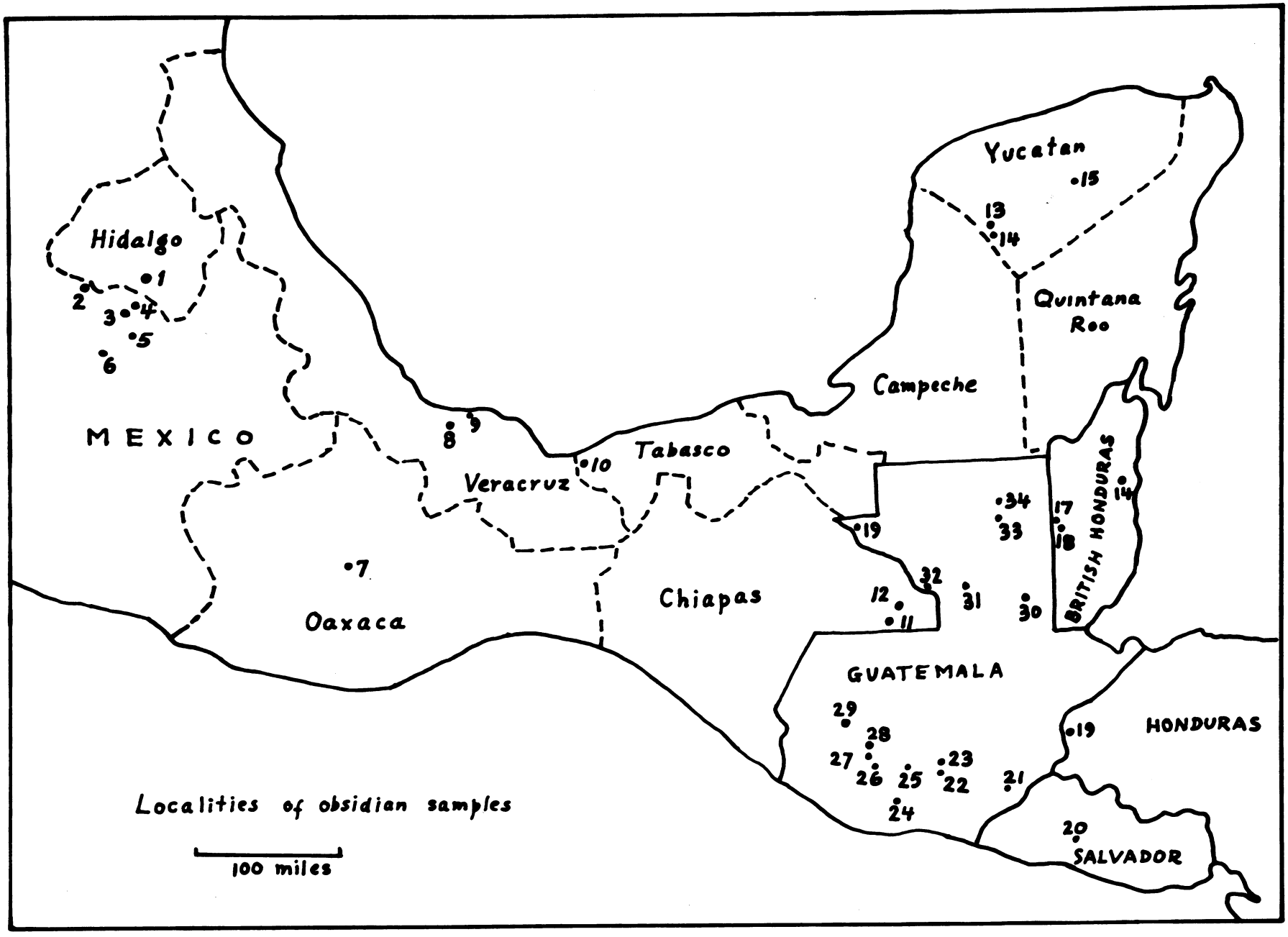
This study, in our opinion, serves mainly to point up the desirability of carrying out large scale studies of this kind, which, potentially at least, have been made possible by the efficient (but not inexpensive) analytical techniques developed in recent years. The crucial question concerning the divergence from source to source can be answered completely only be analyzing a sufficiently large number of samples from each of the individual sources. A substantial step in this direction has been made in the study already mentioned (Jack, Le Joie and Carmichael 1967), in which the similarity of composition (using the Zr-Sr-Rb ternary as criterion) within one lava flow was

found to be satisfactory. In our case, we can get information on this question from a few samples collected at the same sources at different instances. Thus, samples 1-4 and 1-8 are from the same source – the deposit at Papalhuapa, Guatemala. One sample is red, the other black. The analyses are seen to compare quite closely. Samples 1-3, 3-6A, and 3-6B are all from the Pachuca deposit (Group 2), and again give very similar analyses. Samples 1-9 (our reference sample for x-ray fluorescence) and 2-31 are from El Chayal, Guatemala, and they compare quite well with each other. Samples 2-20, 3-5A, and 3-5B are from the source deposit at Otumba, Mexico, and again the comparison is satisfactory. It should be noted, however, that of the four Mesoamerican sources only one (Pachuca) is different enough from the others to be clearly distinguishable. On the other hand, the samples in Group 1 are distinct from both Group 0 and Group 2; two of these samples are from California. No obsidian rock was found that corresponds to the Mesoamerican samples of Group 1, and it is thus not unlikely that these artifacts were made from obsidian obtained from at least one source as yet unknown to us.

The published literature on Mesoamerican obsidian working techniques, mining, and quarrying, and implement manufacturing techniques is large and scattered. We have not made any special effort to compile a bibliography on this subject, but have encountered some published data which we cite here in the hope that other workers may find them useful.

Stoll (1886:432-434) mentions the El Chayal source. It is also described by Holmes (1919:227) and by Coe and Flannery (1964). Thompson (1963:207) mentions a "vast deposit of obsidian" at Zacapa, Guatemala. We now know that this is in error, and that the obsidian seen along the railroad at this place is roadbed ballast carried there from El Chayal. Villacorta (1927) first mentions, although very casually, the obsidian at the site of Papalhuapa, Guatemala. This locality has been described geologically by Williams, McBirney and Dengo (1964).

The obsidian mines in southern Hidalgo, Mexico, were described by Holmes (1900,1919) and Breton (1902), and more recently by Spence and Parsons (1967) and Spence (1967). Breton (1902) also provides brief descriptions of obsidian workshop-quarry sites at Zinepecuaro, Michoacán, and near Guadalajara, Jalisco. Known or reported obsidian sources in Mexico are listed and mapped in Heizer, Williams and Graham (1965:98,map 5). The statement by Lunardi (1948:290) that obsidian is common in the vicinity of La Esperanza and Intibucá, Honduras, has not been verified, and judging from what is known of the geology of this area, the claim is probably incorrect. Hints of other Mesoamerican and Central American obsidian sources are contained in an article by Washington (1921).


Yucatan
15
13
14
Hidalgo
1
2
3
4
5
6
Quintana Roo
Campeche
MEXICO
8
9
10
Tabasco
Veracruz
19
34
33
17
18
14
BRITISH HONDURAS
7
Oaxaca
Chiapas
32
12
11
31
30
GUATEMALA
29
28
27
26
25
24
23
22
21
19
HONDURAS
20
SALVADOR
Localities of obsidian samples
100 miles

Map 1

Table 1. RELATIVE ABUNDANCE OF ELEMENTS (COUNTS PER SECOND OVER BACKGROUND) IN SAMPLES

Sample	Si	Cl	K	Ca	Ba	Ti	Fe	Co	Ni	Cu	Zn	Rb	Sr	Zr	Nb	Mn(ppm)*
1-1	1480	10	2400	320	32	75	1130	0	18	135	25	140	0	210	30	150
2	1410	15	2450	335	25	60	1140	0	23	145	32	165	0	205	0	130
3	1360	20	2350	130	0	140	1880	0	25	135	78	140	0	720	85	1150
4	1440	9	2300	900	65	170	1080	0	15	150	15	80	110	160	0	500
5	1260	9	2400	960	60	150	1060	0	0	135	0	65	90	120	0	410
6	1380	18	2500	130	0	145	1900	0	25	135	85	160	20	600	60	1080
7	1290	15	2400	140	0	150	1940	0	25	160	75	150	0	800	70	1170
8	1460	4	2500	970	65	160	1180	15	20	135	20	80	140	150	0	510
9	1520	6	2350	810	50	120	780	15	25	145	25	120	110	110	0	650
9	1320	8	2200	730	45	100	880	5	20	150	35	130	150	160	0	
2-1	1220	7	2000	850	40	95	920	0	10	175	38	120	200	180	0	610
2	1140	5	1900	440	38	60	620	15	10	180	30	100	80	70	10	590
3	1240	19	2300	120	30	135	2250	20	30	170	118	230	0	910	160	1430
4	1120	8	1950	700	45	95	820	15	15	160	20	150	160	150	30	630
5	1090	8	2000	840	50	130	1220	0	5	165	25	90	150	210	0	450
6	1140	8	1850	690	50	90	860	0	10	165	20	150	180	160	0	580
7	1140	10	1900	710	45	75	820	10	15	175	20	150	160	130	0	620
8	1280	17	2600	190	25	200	1920	0	15	170	55	130	0	>>500	60	860
1-9	1360	10	2150	720												
2-9	1080	7	1800	720	35	85	800	0	15	160	20	120	130	100	0	560
10	1380	18	2650	300	25	100	1280	0	10	165	25	210	10	270	60	410
11	1340	9	2300	850	50	150	1320	15	10	165	30	100	170	210	10	440
12	1280	17	2275	120	20	135	2175	10	30	170	100	220	0	880	100	1210

(continued)

Table 1. (Contd-1)

Sample	Si	Cl	K	Ca	Ba	Ti	Fe	Co	Ni	Cu	Zn	Rb	Sr	Zr	Nb	Mn(ppm)*
1-9	1200	8	2050	720												
2-13	1160	9	2100	810	55	150	1320	0	10	165	25	100	150	210	10	720
14	1180	5	1700	600	45	90	840	10	15	175	15	170	180	170	0	600
15	940	9	1650	765	35	70	700	10	15	145	25	120	120	120	0	640
16	1140	6	1850	785	45	95	820	15	20	155	35	110	180	135	0	560
17	1240	6	2050	720	40	90	810	20	25	150	20	170	170	140	0	750
18	960	6	1700	720	60	85	700	10	15	160	25	100	170	135	0	440
19	1200	7	2150	830	50	130	1200	5	12	150	20	100	180	190	0	490
20	1240	5	2100	790	43	105	1140	10	15	155	25	100	150	185	15	440
1-9	1380	8	2200	800												
2-21	1260	6	2250	830	40	95	1130	23	25	145	35	140	120	180	0	440
22	1040	9	1900	740	35	85	970	20	15	160	30	120	120	150	0	300
23	1140	9	2000	750	43	80	740	10	10	145	20	150	150	130	0	590
24	1320	9	2200	750	40	78	780	5	15	125	30	130	150	120	0	900
25	1300	8	2150	890	48	90	840	20	15	135	15	125	190	150	0	550
26	1160	9	1950	800	40	80	640	10	15	110	10	140	170	150	0	600
27	1080	10	1900	840	40	95	620	15	10	120	20	90	170	140	0	530
28	880	17	1800	205	20	100	1600	10	20	115	55	140	30	640	50	920
29	1280	7	2200	760	50	90	650	0	10	120	20	140	130	125	0	720
30	1280	9	2250	875	50	135	940	0	15	115	15	120	170	210	0	530
1-9	1220	10	2100	750												
1-9	1320	9	2150	745												
2-31	1200	10	2050	720	45	90	610	10	25	115	25	140	140	140	15	700

Table 1. (Contd-2)

Sample	Si	Cl	K	Ca	Ba	Ti	Fe	Co	Ni	Cu	Zn	Rb	Sr	Zr	Nb	Mn(ppm)*
2-32	1220	11	2050	820	50	90	660	10	10	115	20	90	200	140	0	530
33	1180	9	1750	680	40	90	640	0	10	100	20	125	140	140	0	690
34	1260	8	2150	775	40	38	660	10	15	125	15	150	160	170	0	670
35	1260	11	2150	890	45	95	740	0	10	120	25	110	200	160	0	580
36	1100	7	1900	830	40	85	630	10	0	120	12	100	150	170	0	510
37	1300	11	2300	900	55	135	1000	0	0	100	15	100	180	210	0	510
38	1340	11	2150	870	43	100	700	10	5	110	15	120	190	130	0	560
39	1220	11	2100	720	41	75	630	0	10	110	15	100	120	120	0	740
40	1180	7	2150	740	43	83	620	0	10	130	23	150	150	135	0	640
41	1220	11	2100	740	40	85	660	0	10	110	25	115	150	130	0	650
42	1280	8	2150	860	45	95	660	0	15	115	5	120	190	130	0	570
43	1280	9	2100	730	40	93	660	0	7	110	20	140	140	150	0	730
44	1140	9	1950	720	38	85	620	15	0	115	20	140	120	115	0	620
1-9	1220	6	2000	700												
2-45	1120	23	2250	100	0	150	1740	0	25	110	80	180	0	1000	80	1350
46	940	20	2000	120	0	110	1520	0	23	110	65	175	0	830	60	940
47	740	9	1850	450	30	100	1270	20	20	115	20	205	10	160	0	100
48	1220	10	2000	720	43	90	660	10	10	100	25	140	150	170	0	640
49	**	12	1850	145	25	165	1400	8	15	110	45	140	0	520	0	1070
(3-1	1100	10	2100	350	40	120	1100	10	15	140	20	120	10	180	0)***	240
3-2	1220	9	2150	360	40	135	1180	20	10	165	20	140	20	180	0	270
3	1160	12	2100	340	40	135	1180	10	20	170	20	120	30	160	10	250
4	1240	9	2000	760	60	195	1160	20	10	165	15	80	120	160	20	500

Table 1. (Contd-3)

Sample	Si	Cl	K	Ca	Ba	Ti	Fe	Co	Ni	Cu	Zn	Rb	Sr	Zr	Nb	Mn(ppm)*
3-5A	1220	5	1900	720	55	160	1160	5	12	170	20	120	120	140	10	400
5B	1200	9	1850	700	50	165	1160	0	10	170	30	120	120	160	10	400
6A	1220	20	2000	80	10	195	2020	10	25	155	70	170	10	770	80	1250
6B	1160	16	2150	140	10	290	1780	20	25	155	55	100	30	580	50	1220

* The values for manganese were obtained by Neutron Activation Analysis and are given in parts per million.

** Not determined.

*** Approximate values.

Table 2

Sample Identification*
(Obsidians are black or gray unless otherwise noted)

Site No. on Map 1	Sample No.	Source Locality
	1-1	Glass Mt., near St. Helena, Napa Co., Calif. Sample from quarry. Collected by R. F. Heizer, 1959.
	1-2	Site CA-Sol-2, Solano Co., Calif. Artifact in Lowie Museum of Anthropology
1	1-3	Green obsidian. Pachuca, Hidalgo, Mex. Sample from quarry. Coll. by W. H. Holmes.
21	1-4	Papalhuapa, Depto. Jutiapa, Guatemala. Sample from quarry. Coll. by H. Williams, J. Graham, R. Heizer, 1964.
19	1-5	Copán. Artifact in Peabody Mus. Coll., Harvard University
3	1-6	Green obsidian. Teotihuacán, Mex. Surface artifact.
10	1-7	Green obsidian. La Venta, Tab. Surface artifact.
21	1-8	Red obsidian. Papalhuapa, Depto. Jutiapa, Guatemala. Sample from quarry.
23	1-9	El chayal, Depto. Guatemala, Guatemala. Sample from quarry.
10	2-1	La Venta, Tab. Surface artifact.
10	2-2	La Venta, Tab. Surface artifact.
5	2-3	Green obsidian. Texcoco, Valley of Mexico, Los Melones Md. Artifact in Peabody Mus. Coll., Harvard University.
12	2-4	Yaxun, Lower Lacantun R., Chiapas, Boco or Jimba Phase. Artifact in Peabody Mus. Coll., Harvard University.
13	2-5	Cave of Loltun, Yucatan. Entrance to Chamber 1. Artifact (c/1998) in Peabody Mus. Coll., Harvard University.
	2-6	Cave of Loltun, Yucatan, Sec. 1, Chamber 3. Artifact (c/2023) in Peabody Mus. Coll., Harvard University.
14	2-7	Labna, Yucatan, Md. 6 Late Classic Period. Artifact (c/2262) in Peabody Mus. Coll., Harvard University.
7	2-8	Green obsidian, Mitla, Oaxaca. Artifact (c/5917) in Peabody Mus. Coll., Harvard University.

Table 2 (cont'd.)

Site No. on Map 1	Sample No.	Source Locality
11	2-9	San Lorenzo, Lacantun R., Chiapas. Artifact in Peabody Mus. Coll., Harvard University.
6	2-10	Cuicuilco, D.F., Mexico. Tlalpan Phase (field cat. 769). University of California Collection.
20	2-11	"El Salvado." Artifact (30.0/2863) in Amer. Mus. Nat. Hist. Collection.
2	2-12	Green obsidian, Tula, Hidalgo. Mexico. Surface artifact. Artifact in Amer. Mus. Nat. Hist. Collection.
19	2-13	Copán, Honduras. Artifact in Peabody Mus. Coll., Harvard University.
34	2-14	Uaxaxtun, Depto. Petén, Guatemala. Stela A-7 cache, Late Classic Period. Artifact (33-99-20/3393) in Peabody Mus. Coll., Harvard University.
17	2-15	Benque Viejo, British Honduras. Artifact in Peabody Mus. Coll., Harvard University.
31	2-16	Seibal, Depto. Petén, Guatemala. Collected by J. Graham, 1965.
25	2-17	Iximche, Late Post Classic. Depto. Chimaltenango. Surface artifact collected by J. Graham and R. Heizer, 1965.
18	2-18	Nohoch Ek, Cayo Dist., British Honduras, Periods 4 and 5. Artifact in Peabody Mus. Coll., Harvard University.
14	2-19	Weston site 6, near Belize, British Honduras. Terminal Classic. Artifact (3-20232) in Peabody Museum Coll., Harvard University.
4	2-20	Obsidian source locality ("Mine") 2 km. NE of San Marcos, near Otumba, Estado de México. Collected by M. Spence, 1966.
3	2-21	Teotihuacán, Tlamimilolpa Phase. Site sector 21E:N5W1. Collected by J. Bennyhoff.
3	2-22	Teotihuacán, Tzacualli phase, Zona 5-9, Calle de los Muertos 0.199. Collected by Florencia Muller.
33	2-23	Tikal, Depto. Petén, Guatemala, Early Classic. Artifact (12C-408/29) in Univ. of Pennsylvania Mus. Collection.

Table 2 (cont'd.)

Site No. on Map 1	Sample No.	Source Locality
33	2-24	Tikal, Depto. Petén, Guatemala, Early Classic. Artifact (12K-164-18) in Univ. of Pennsylvania Mus. Collection.
33	2-25	Tikal, Depto. Petén, Guatemala, Late Preclassic. Artifact (12P-167/89) in Univ. of Pennsylvania Mus. Collection.
33	2-26	Tikal, Depto. Petén, Guatemala, Late Preclassic. Artifact (12P/138) in Univ. of Pennsylvania Mus. Collection.
33	2-27	Tikal, Depto. Petén, Guatemala, Middle Preclassic. Artifact (12P/152) in Univ. Penn. Mus. Collection.
33	2-28	Tikal, Depto. Petén, Guatemala, Early Classic. Artifact (127-226C/33) in Univ. Penn. Mus. Collection.
33	2-29	Tikal, Depto. Petén, Guatemala, Late Classic. Artifact (41F/2) in Univ. of Pennsylvania Mus. Collection.
33	2-30	Tikal, Depto. Petén, Guatemala, Early Post Classic. Artifact (98L/10) in Univ. Penn. Mus. Collection.
23	2-31	El Chayal, Depto. Guatemala, Guatemala. Sample from quarry.
24	2-31	Bilbao (Sta. Lucia Colzumahualpa), Depto. Escuintla, Guatemala. Surface artifact coll. by Graham, Heizer & Williams 1965.
34	2-33	Uaxactun, Tepeu phase, Depto. Petén, Guatemala. Artifact in Guatemala Museum of Archaeology Collection.
34	2-34	Uaxactun, Tepeu phase, Depto. Petén, Guatemala. Artifact in Guatemala Museum of Archaeology Collection.
28	2-35	Zacualpa, Depto. Quicha, Guatemala, Post Classic Period. Artifact in Peabody Mus. Coll., Harvard University.
28	2-36	Zacualpa, Depto. Quiche, Guatemala, Post Classic Period. Artifact in Guatemala Museum of Archaeology Collection.
30	2-37	Poptun, Depto. Petén, Guatemala. Late Classic Period. Artifact in Guatemala Museum of Archaeology Collection.
27	2-38	Utatlan, Depto. Quiche, Guatemala. Classic Period. Artifact in Peabody Mus. Coll., Harvard University.
29	2-39	Nebaj, Depto. Quiche, Guatemala. Classic Period. Artifact in Peabody Mus. Coll., Harvard University.

Table 2 (cont'd.)

Site No. on Map 1	Sample No.	Source Locality
32	2-40	Altar de Sacrificios, Depto. Petén, Guatemala. Artifact in Guatemala Museum of Archaeology Collection.
19	2-41	Piedras Negras, Depto. Petén, Guatemala. Classic Period. Artifact in Guatemala Museum of Archaeology Collection.
26	2-42	Agua Escondida, near lake, Depto. Solola, Guatemala. Artifact in Guatemala Museum of Archaeology Collection.
22	2-43	Kaminaljuyu, Depto. Guatemala, Guatemala. Artifact collected by R. Heizer and J. Graham, 1966.
22	2-45	Green obsidian, Kaminaljuyu, Depto. Guatemala, Guatemala. Early Classic (Tomb A-V). Artifact in Guatemala Museum of Archaeology Collection.
		Cenote of Sacrifice, Yucatan, Mexico. Artifact in Peabody Museum Collection, Harvard University.
15	2-46	Green obsidian, Chichén Itzá, Yucatan, Mexico. Artifact (c/5042) in Peabody Mus. Coll., Harvard University.
15	2-47	Chichén Itzá, Yucatan, Mexico. Artifact (c/5038) in Peabody Museum Collection, Harvard University.
15	2-48	Chichén Itzá, Yucatan, Mexico. Artifact (c/4919) in Peabody Museum Collection, Harvard University.
	2-49	Green obsidian, Lovelock Cave, Churchill Co., Nevada. Artifact (1-19208) in Univ. Calif. Lowie Mus. Collection.
8	3-1	Tres Zapotes, Veracruz, Mexico. Preclassic Period (?) (sub-ash cultural level Trench 26). Collected by P. Drucker and R. Heizer, 1967.
9	3-2	Site buried in sand dune near Roca Partida, Tuxtla Mts., Veracruz, Mexico. Probably Preclassic. Collected by J. Graham, R. Heizer, H. Williams, 1967.
9	3-3	Eroded site on beach near Punta Roca Partida, Tuxtla Mts., Veracruz, Mexico. Probably Preclassic.
19	3-4	Copán, Honduras. Classic Period. Surface artifact collected by R. Heizer, J. Graham, H. Williams, Feb. 1967.

Table 2 (cont'd.)

Site No. on Map 1	Sample	Source Locality
4	3-5A	Otumba, Estado de México, Mexico. Mine No. 1. Collected by Michael Spence, 1965.
4	3-5B	Otumba, Estado de México, Mexico. Mine No. 1. Collected by Michael Spence, 1965.
1	3-6A	Green obsidian, "Pachuca Mine No. 2," near Huasca, Hidalgo, Mexico. Collected by Michael Spence, 1965.
1	3-6B	Green obsidian, "Pachuca Mine No. 2," near Huasca, Hidalgo, Mexico. Collected by Michael Spence, 1965.

* We wish to thank the following persons for supplying obsidian samples:

Drs. W. R. Coe and H. Moholy-Nagy of the University of Pennsylvania Museum (samples 2-23 / 2-30);

Dr. Harry Pollock, Peabody Museum, Harvard University (samples 1-5, 2-3 / 2-9, 2-13 / 2-15, 2-18, 2-19);

Dr. Gordon Ekholm, American Museum of Natural History (samples 2-11, 2-12);

Sr. Gustavo Espinosa, Guatemala Museum of Archaeology (samples 2-33, 2-34, 2-36, 2-37, 2-40, 2-41, 2-45);

Drs. J. A. Bennyhoff and Michael Spence, and Dra. Florencia Muller, Proyecto Teotihuacán (samples 2-2C / 2-22, 3-5A / 3-6B);

Dr. Clifford Evans, U.S. National Museum (samples 1-3).

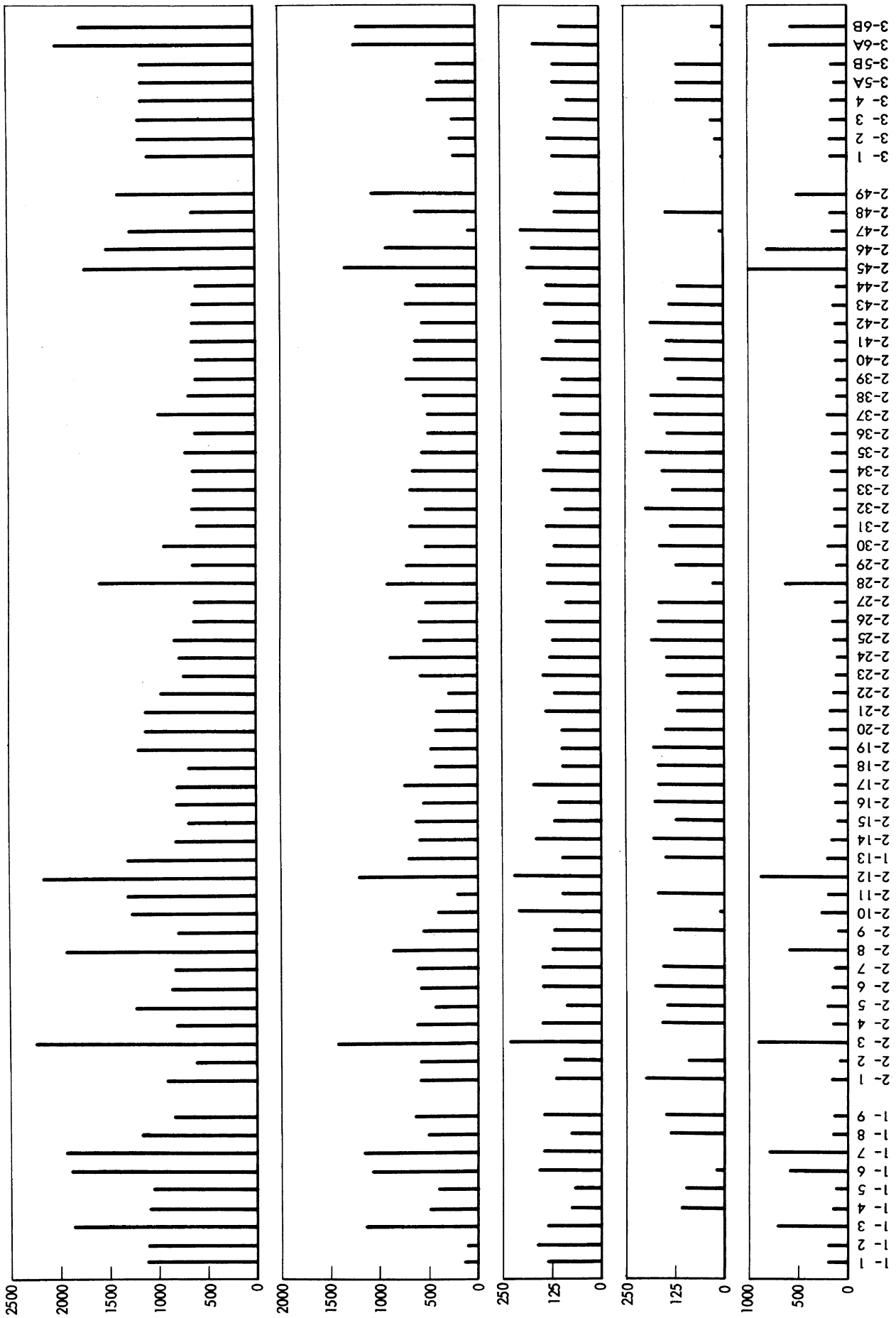


Figure 1. BAR GRAPH OF ANALYTICAL RESULTS

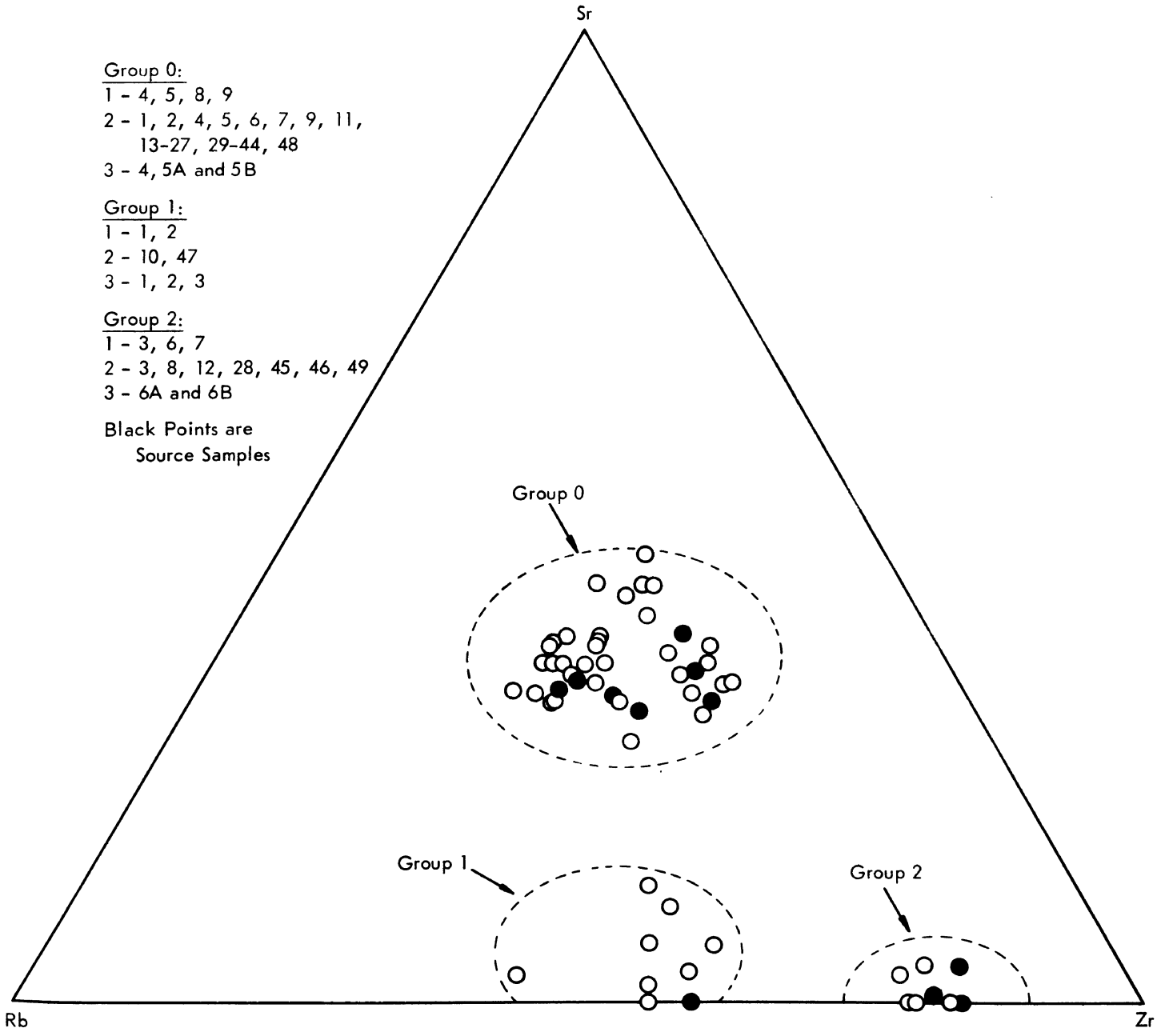


Figure 2. NORMALIZED RATIOS OF Zr-Sr-Rb

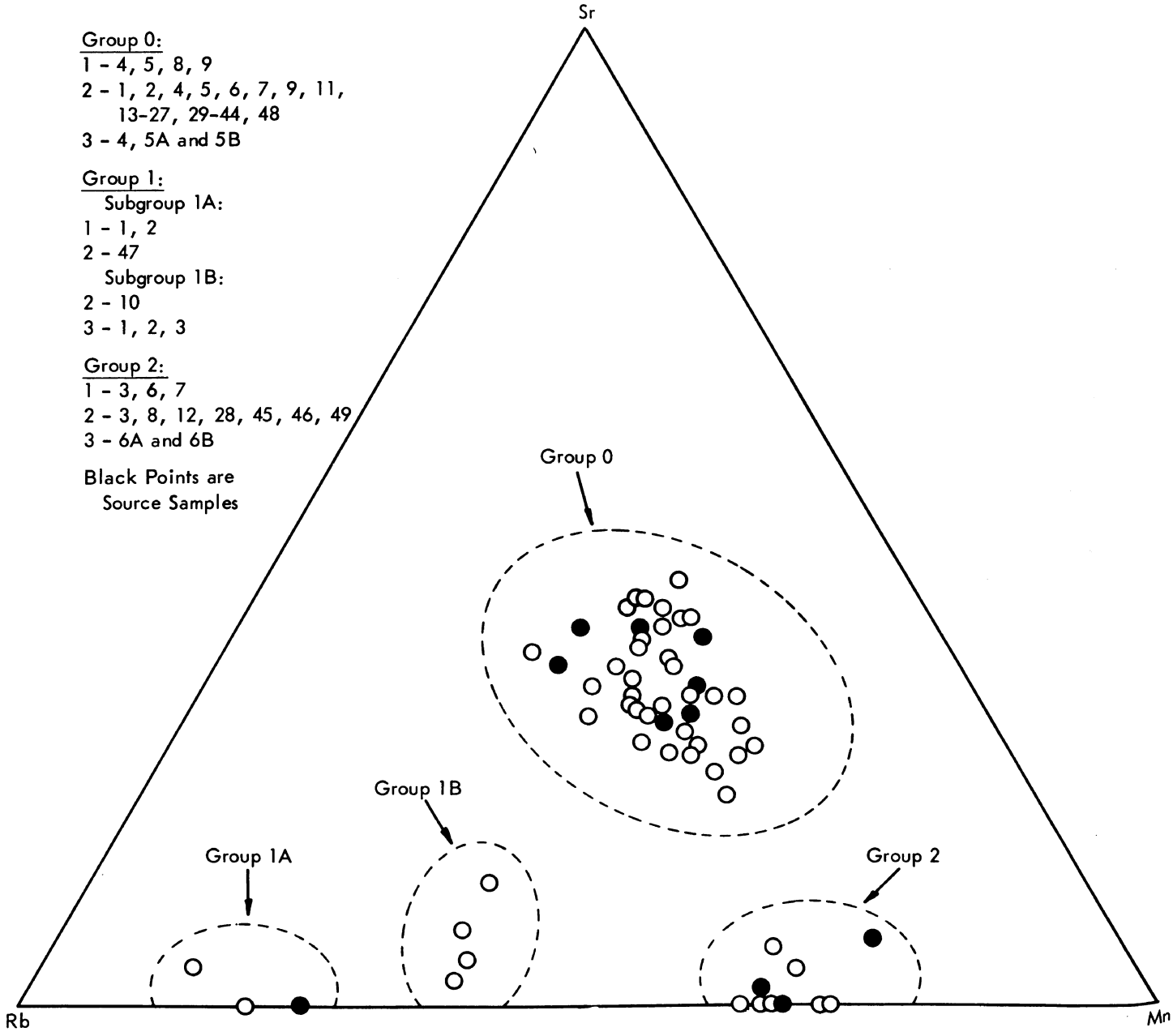


Figure 3. NORMALIZED RATIOS OF Mn-Sr-Rb

Bibliography

Azurdia, Carlos Enrique
1927 Las Ruinas de Papalhuapa. Anales de la Sociedad de Geografía e Historia, 4: 1:65-70.

Breton, A.
1902 Some Obsidian Workings in Mexico. 13th Intern. Cong. Amer., 265-268. New York.

Cann, J. R. and C. Renfrew
1964 The Characterization of Obsidian and Its Application to the Mediterranean Region. Proc. Prehistoric Soc. for 1964, 30:111-133.

Castiglioni, O. C., F. Fussi and G. D'Agnolo
1963 Indagini sulla provenienza dell' ossidiana utilizzata nelle industrie preistoriche del Mediterraneo Occidentale. In Atti della Societá Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano, Vol. CII, Fasc. 111, 310-322.

Coe, M. D and K. V. Flannery
1964 The Pre-Columbian Obsidian Industry of El Chayal, Guatemala. American Antiquity, 30:43-49.

Dixon, J. E., J. R. Cann and C. Renfrew
1968 Obsidian and the Origins of Trade. Scientific American, 218: 3:38-46.

Drucker, Philip
1952 La Venta, Tabasco. A Study of Olmec Ceramics and Art. Bureau American Ethnology, Bulletin 153. Washington, D.C.

Green, R. C., R. R. Brooks and R. D. Reeves
1967 Characterization of New Zealand Obsidians by Emission Spectroscopy. New Zealand Journ. Sci., 10: 3:675-682, Wellington.

Heizer, R. F., H. Williams and J. A. Graham
1965 Notes on Mesoamerican Obsidians and Their Significance in Archaeological Studies. Contributions of the Univ. Calif. Archaeol. Res. Facility, No. 1:94-103, Berkeley.

Holmes, W. H.
1900 The Obsidian Mines of Hidalgo, Mexico. American Anthropologist, 2: 3:405-416.

1919 Handbook of Aboriginal American Antiquities. Bureau American Ethnology, Bulletin 60. Washington, D.C.

Jack, R. N., K. R. Lajoie and I. S. E. Carmichael
1967 "Finger-Printing" of Obsidian and Pumice from the Western United States. Proc. 80th Ann. Meeting, Geol. Soc. of America, New Orleans, La., Nov. 20-22, 1967 (p. 107).

Lunardi, Federico
1948 Honduras Maya: Etnología y Arqueología de Honduras. Tegucigalpa, Honduras.

Parks, George A. and T. T. Tieh
1966 Identifying the Geographical Source of Artefact Obsidian. Nature, No. 5046:289-290.

Renfrew, Colin, J. R. Cann and J. E. Dixon
1965 Obsidian in the Aegean. The Annual of the British School of Archaeology at Athens, 60:225-247, Oxford.

Renfrew, Colin, J. E. Dixon and J. R. Cann
1966 Obsidian and Early Cultural Contact in the Near East. Proc. Prehistoric Soc. for 1966, 32:30-72.

Spence, Michael W.
1967 The Obsidian Industry of Teotihuacán. American Antiquity, 32: 4:507-514.

Spence, Michael and J. Parsons
1967 Prehispanic Obsidian Mines in Southern Hidalgo. American Antiquity, 32: 4:542-543.

Stephens, J. L.
1962 Incidents of Travel in Yucatan. 2 vols. Norman, Oklahoma.

Stoll, Otto
1886 Guatemala, Reisen und Schilderungen aus den Jahren 1878-1883. Leipzig.

Thompson, J. E. S.
1963 Maya Archaeologist. Norman, Oklahoma.

Villacorta Calderón, J. A. and Carlos A. Villacorta
1930 Arqueología Guatemalteca. Guatemala.

Washington, H. S.
1921 Obsidian from Copán and Chichén Itzá. Journ. Washington Acad. Sci., 11:481-487.

Weaver, J. R. and F. H. Stross
1965 Analysis by X-Ray Fluorescence of Some American Obsidians. Contributions of the Univ. Calif. Archaeol. Res. Facility, No. 1:89-93, Berkeley.

Williams, H., A. R. McBirney and G. Dengo
1964 Geologic Reconnaissance of Southeastern Guatemala. Univ. Calif. Publs. Geol. Sci., Vol. 50, Berkeley.

V. "FINGER-PRINTING" OF SOME MESOAMERICAN OBSIDIAN ARTIFACTS

Robert N. Jack and Robert F. Heizer

ABSTRACT

A total of 176 obsidian samples are here reported on. These include 151 samples of Mesoamerican obsidian collected in January-February, 1968, from the surface of the Olmec site of La Venta, Tabasco, Mexico, 12 excavated samples of obsidian from La Venta, 10 obsidian pieces from the Olmec site of Tres Zapotes, Veracruz, 2 samples from the Aztec site of Tlatelolco, and one from the Maya site of Comalcalco. The obsidian samples have been analyzed by non-destructive x-ray fluorescence rapid scan technique for the elements rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr), and niobium (Nb). This method has been successful in characterizing 163 of the 176 samples (92.6%) into five chemically distinct groups. Examination of the samples in hand specimen has revealed consistent, although usually subtle, visual characteristics of each of these five chemical groups, confirming that they are mutually distinct volcanic glasses. A geologic source has been established for only one of these obsidian types, indicating a need for further geologic and archaeologic sampling to identify the sources and determine the time, mechanisms, and extent of distribution of particular obsidians in Mesoamerica in prehistoric times.

INTRODUCTION

In addition to providing precise quantitative chemical analyses, the x-ray fluorescence technique can provide very rapid semi-quantitative determinations of many elements in low concentrations in a variety of samples. It has been shown (Jack, Carmichael and Lajoie 1967) that natural (volcanic) glasses (obsidians and pumices) from various volcanic centers in California, western Nevada, and southern Oregon may be characterized chemically by their minor and trace element compositions. In that study the concentrations of 19 elements were reported; however, for the purpose of the characterization of obsidians from a limited geographical area, it is often sufficient to make a rapid semi-quantitative determination of only a few elements. In order to test the feasibility of this method as applied to Mesoamerican obsidians, 151 obsidian fragments collected in 1968 from the surface of the La Venta site, plus another 25 pieces of obsidian collected in the course of archaeological investigations of the La Venta and other Mesoamerican sites, were analyzed by x-ray fluorescence rapid scan technique. The purpose of this note is to summarize the results of the reconnaissance study.

ANALYTICAL METHOD

For very rapid semi-quantitative comparative determination of the chemical compositions of a large number of samples by x-ray fluorescence analysis, the most satisfactory technique is often a rapid scan over the spectral region of the elements of interest, the data being presented on a chart recorder. One of the most convenient spectral regions for such determinations of trace element compositions of natural glasses (obsidians) includes the x-ray emission lines Nb Kα, Zr Kα, Sr Kα, Rb Kα, Th Lα, and Pb Lβ (0.74 angstrom to 0.99 angstrom) in which the relative Zr Kα, Sr Kα, and Rb Kα intensities are particularly useful for plotting obsidian compositions. The sample (up to 1¼" in diameter for the currently used sample cup) is placed in the cup in the form of a flake or artifact (obsidian), rock chip (pumice, rhyolite, etc.), loose grains or powder, or in the form of a specially prepared pellet usable also for precise quantitative analyses. In spite of variations in the effective sample surface of randomly broken pieces or loosely packed grains, relative intensities of the various spectral lines over a narrow wavelength region may be very precisely determined. Quite precise "absolute" concentrations may also be obtained in many analytical situations by using the primary beam (continuum plus characteristic radiation of the target material) scattered from the sample to standardize the effective intensities (chart recorder deflection) from sample to sample by varying the spectrograph tube current (Ma).

The technique utilized for this study allows the recording of the required spectral scan of one sample in approximately 7 minutes, or, including sample changes and resetting the instrument, at least 6 samples per hour. No sample preparation is required other than a washing in water if the obsidian flake is coated with soil, and trimming or breaking of the specimen to fit the sample cup if it exceeds 1¼" in length. After setting the counting rate at the starting angle of the scan to a standard value (2000 counts per second for these analyses) by adjusting the spectrograph tube current, the spectrograph scans automatically. The measurements of the amplitude of the spectral peaks on the chart, the computation of the corrections for spectral interferences, and the calculation of the relative intensities of the spectral lines for each sample can be made while other samples are being scanned.

These analyses were made in the Department of Geology and Geophysics, University of California, Berkeley, on a Norelco (Philips) Universal Vacuum X-ray Spectrograph using a tungsten tube, LiF {220} analyzing crystal, scintillation detector with pulse height discrimination, and an air path. The scans were made at 2 degrees (two-theta) per minute.

RESULTS OF THE ANALYSES

The results of the x-ray fluorescence scans of the La Venta surface obsidian samples are plotted in Figure 1 as relative x-ray emission line intensities of Rb Kα, Sr Kα, and Zr Kα for each of 150 samples. One sample only (No. 1) is not plotted as it yielded no measurable spectral output for these elements and may in fact be non-igneous (e.g. flint). From the plotted data in Figure 1 it is clear that there are three distinct chemical groups represented by the surface samples from La Venta, each presumably representing a separate geologic source rock. These have been designated types A, B, and C. Also identifiable are two other types, here designated as types D and E, based in part upon scans of the samples from Tres Zapotes (type D) and inspection of the obsidians in hand specimen (types D and E). Of the 151 surface samples from La Venta, 142 fall within these 5 groups. Average values of the two scans are plotted for samples numbered 3, 52, 75, 78, and 89 since they are particularly small or irregular in shape.

On Figure 2 are plotted the analyses of the 12 excavated samples from La Venta and 13 samples from Tres Zapotes, Comalcalco, and Tlatelolco sites and the analyses of three potential geologic source obsidians (Pachuca, Hidalgo, Mexico; El Chayal, and Ixtepeque, Guatemala). It can be seen that 21 of these 25 archaeological samples fall within 4 of the same 5 chemical groups observed in the La Venta surface samples. The other 4 specimens group into two pairs of relative compositions intermediate to types C and E. The El Chayal geologic source sample plots near the group composed of samples numered VII (La Venta) and IX (Comalcalco) and La Venta surface samples numbered 70 and 117, perhaps indicating that El Chayal is the source of these obsidians. However, the present sampling is too small to clearly establish this statistically. The other two labeled samples, numbered XVI and XVII (from Tres Zapotes site), as well as La Venta surface sample number 54, group together, suggestive of another source type. The Ixtepeque geological source material likewise plots outside the five major groups recognized in the La Venta surface samples. La Venta surface samples numbered 4, 5, and 89 fall roughly into the same compositional area as the Ixtepeque sample, but again, any correlation based upon this small number of samples is quite uncertain. As expected, the Pachuca geologic source obsidian plots with the obsidians of type A, supporting the opinion that these distinctive green obsidians are from the Pachuca source.

Obsidians often are quite distinctive in appearance (e.g. the Pachuca green obsidian), no doubt contributing in many cases to their collection and distribution in prehistoric times. With the exception of the distinct green obsidians, cursory inspection of the obsidian samples as they were being prepared for analysis in the spectrograph did not reveal any notable

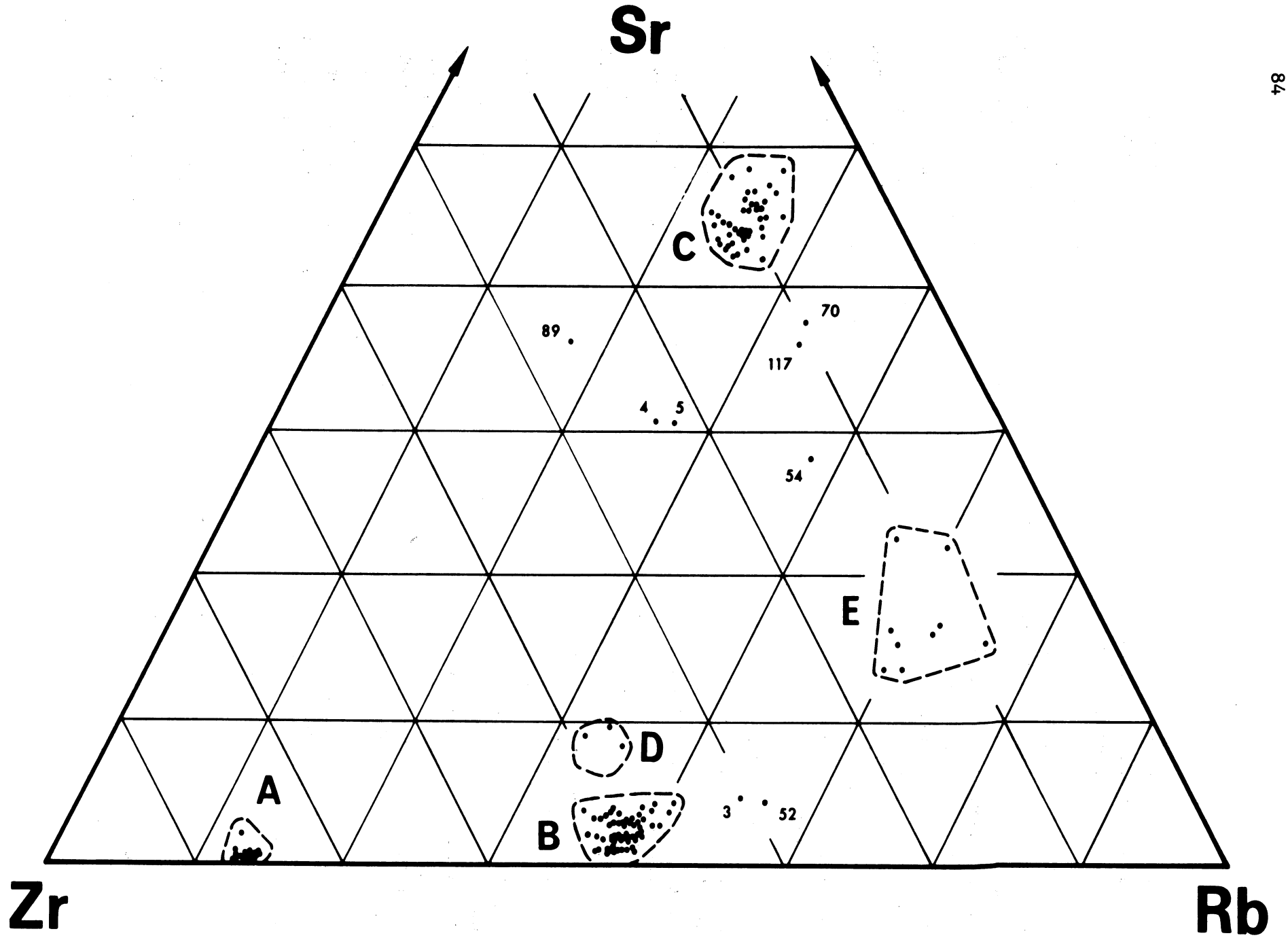


Fig. 1. Plot of La Venta surface samples

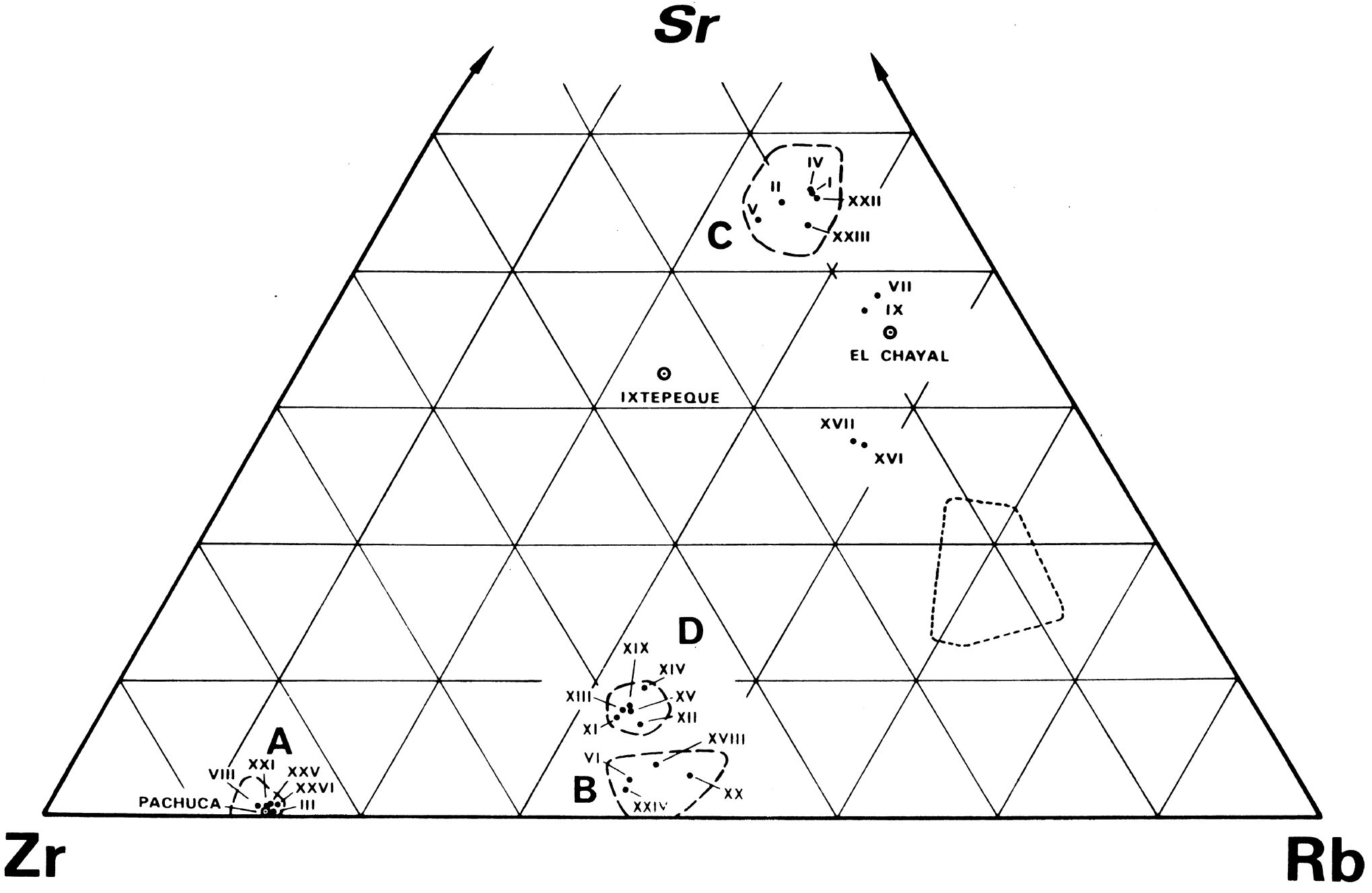


Fig. 2. Plot of obsidian samples (for identification see p. 90)

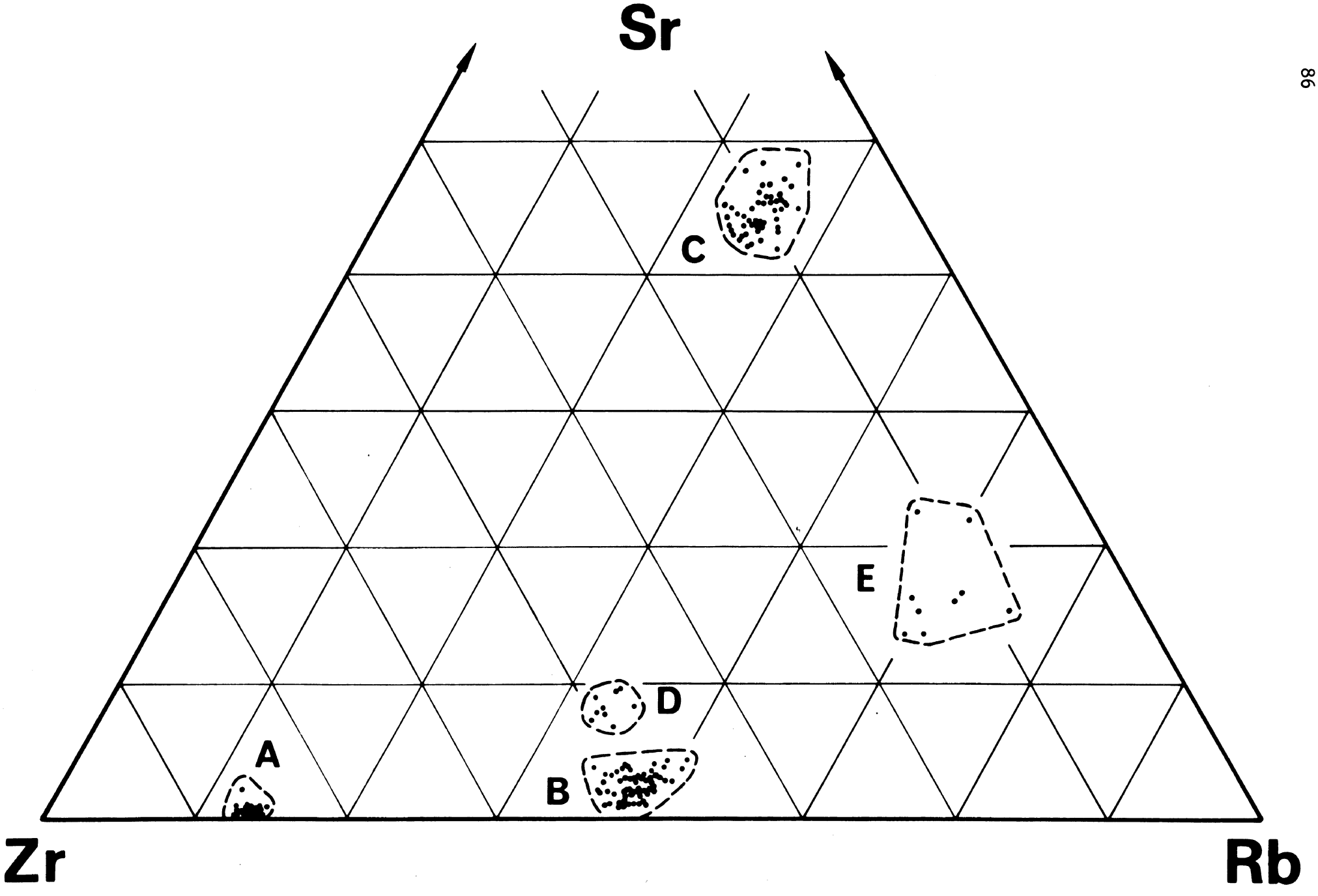


Fig. 3. Composite plot of all samples belonging to types A, B, C, D, E

differences in appearance which seemed trustworthy as criteria for sorting the samples. When it became clear, however, that the obsidians did fall into several distinct groups, based upon x-ray fluorescence analysis, a more detailed inspection of the samples in hand specimen was clearly advisable. Accordingly, the first 55 La Venta surface samples run on the spectrograph were examined under reflected artificial light and on a light table, and any pertinent observations recorded. In addition, all samples found by x-ray fluorescence to lie outside the compositional range of the three dominant (86% of the La Venta surface sample) groups A, B, and C, and all excavated samples catalogued with Roman numerals were examined in a similar manner. The results are summarized in Table 1. The three dominant types A, B, and C have consistent characters, type A being a distinctive green color, type B being a generally uniform smoky gray, and type C being light gray with a definite tan tint with a dense tan to black internal flecking. More significant, however, is the fact that type D samples have a darker, more irregular streaky (inhomogeneous?) appearance than type B, supporting the narrow distinction between the two types observed chemically, and the fact that samples belonging to the rather broad group designated type E have a consistent greenish-yellow tint to their light gray body color, supporting their identification as a valid obsidian type. Of the 12 samples (not including No. 1) not falling within one of the five major chemical types, numbers 54, XVI, and XVII in one group and numbers 70, 117, VII, and IX in another group, are most like type C obsidians in hand specimen, and numbers 3 and 52 are most like type B in hand specimen. Samples numbered 4, 5, and 89, although generally similar to each other in that they are dark gray and finely flow banded or mottled, do not have definite similarity to any other observed groups.

At this time any statistical statement regarding the obsidian types in Mesoamerica must be in terms of the La Venta surface samples or in terms of all samples analyzed (including the La Venta surface samples) since only thus is there a sufficiently large sampling. A summary of the finding of this study is given on page 88. It is notable that by means of the non-destructive x-ray fluorescence rapid scan method 94.0% of the available La Venta surface samples and 92.6% of all samples analyzed may be assigned to one of five major chemical types; 86.0% and 82.4%, respectively, belong to the three major types. Figure 3 is a summary plot of the samples belonging to the five major chemical groups. No chemical types were observed among the excavated samples which were not represented in the La Venta surface sampling; however, type E of the La Venta surface obsidians was not observed among the excavated samples. Both samples from Tlatelolco burials are of type A (Pachuca). Of the 10 Tres Zapotes samples, 6 are of type D, 2 of type B, and 2 are similar to La Venta surface sample 54 in composition. The single Comalcalco sample (No. IX) is similar in composition to La Venta sample VII and two La Venta surface samples, numbered 70 and 117. Sample VII is the only excavated La Venta sample not belonging to one of the three dominant types A, B, or C.

Obsidian Type	La Venta Surface Samples		All Samples	
	No. of Samples	Per cent of Total	No. of Samples	Per cent of Total
A	24	15.9	29	16.5
B	62	41.0	66	37.5
C	44	29.1	50	28.4
D	3	2.0	9	5.1
E	9	6.0	9	5.1
Other	9	6.0	13	7.4
Total	151	100.0	176	100.0

Tables 2 through 6 summarize the data for the 163 samples belonging to each of the five major obsidian groups, and Table 7 presents the same type of data for the remaining 13 samples and the 3 geologic samples (potential sources), generally similar samples being grouped for comparison. The units used are chart divisions measured from the spectrograph charts, one division being equivalent to a counting rate of 20 counts per second. The columns entitled Rb/Σ, Sr/Σ, and Zr/Σ are the values used to plot the composition of each sample on the ternary diagrams. The samples are identified by number in Appendix I, arabic numerals being used for La Venta surface samples and Roman numerals for the excavated La Venta samples and those from other localities. Included in each table are average values (in chart divisions) for Rb, Sr, Y, Sr, and Nb for that obsidian type, with an approximate value in parts per million (by weight) for each element based upon comparison with U.S. Geological Survey standard granite G-1. These values are uncorrected for matrix mass absorption, but are expected to be accurate within a few per cent of the amount present. Also included in Table 2 are measurements taken on green obsidians from northwesternmost Nevada (Hu X-1 and Hu X-2) which confirm their general similarity with the Pachucan green obsidians but also reveal significant differences in the Y, Zr, and Nb concentration levels.

In conclusion, it can be said that the x-ray fluorescence rapid scan technique holds great promise in characterizing Mesoamerican obsidians and thereby contributing to the solution of certain basic archaeological problems. In cases in which the rapid semi-quantitative determination of Rb, Sr, and Zr, plus Y and Nb, doesnot provide adequate resolution between obsidian types, measurement of the concentrations of other elements may be useful. The desirability of further sampling at a number of archaeological

sites, and equally important, the collection of geologic source obsidian, is indicated in order to further define other obsidian chemical types and to establish the sources and distribution of Mesoamerican obsidians.

Initial work on Mesoamerican obsidians by Weaver and Stross (1965) was successful in demonstrating that obsidian from Pachuca (i.e. Cerro de Navajas, Hidalgo) was traded as far south as the La Venta site in the state of Tabasco, but the archaeological sample was collected from the surface and could not be dated. Excavations at La Venta in July, 1967, and January-February, 1968, produced 12 small obsidian blades ("razors"; samples Nos. I-VII, XXI-XXV). All of these, without exception, were recovered from refuse or constructions of the La Venta period (Middle Pre-Classic) and dated at this site in the time span 1000 B.C. - 600 B.C. (cf. Berger, Graham and Heizer 1967). Since three of these are of Type A obsidian from Pachuca, we can be certain of the fact that obsidian from the Mexican highland was being traded to southeastern Mexico in the Middle Pre-Classic. Drucker (1952:145) observes that he found no green obsidian in the test pits and stratigraphic trenches dug by him at La Venta in 1941. We do not know how to explain this, since several of our pits were in areas immediate to those where he had dug some twenty years earlier. Obsidian samples from highland Olmec sites such as Tlapacoya, Tlatilco, Las Bocas, Chalcatzingo, and others, when analyzed by the method employed here might provide us with information on the intensity of contacts between these various sites.

The Ixtepeque (Guatemala) source is apparently not represented at La Venta, unless we accept the general similarities of La Venta samples 4, 5, and 89 to Ixtepeque obsidian as supporting this. However, this is not surprising in view of the fact that these two spots lie 380 airline miles apart. At the same time, it is puzzling to find that the El Chayal source in Guatemala (Coe and Flannery 1964) may have provided the material for samples VII, 70, and 117 (from La Venta) and IX (from Comalcalco). In view of the Olmec presence in Salvador (Boggs 1950) and southeastern Quetzaltenango, Guatemala (Thompson 1943:III, fig. a), it would not be surprising to find some indication of material interchange between the Veracruz-Tabasco Olmec area and the Guatemala-Salvador region.

A single source, not now identified, supplied obsidian both to the La Venta and Tres Zapotes sites as judged from samples XVI and XVII (Tres Zapotes) and No. 54 (La Venta).

One obsidian type (E) known from surface artifacts at La Venta was not found in excavations. This obsidian may either date from post-La Venta phase times at the La Venta locality or, since it is represented by only 9 specimens, it may be a rare type which we did not encounter in our limited investigations of 1967 and 1968.

Of the five major source types identified (A,B,C,D,E) only type A is now locatable. Type B obsidian is the most abundant at La Venta, type C is next most common, and type A is in third place. The greatest need now is to have samples of source obsidians with which to correlate La Venta artifacts.

APPENDIX I

LOCALITY DESCRIPTIONS OF SAMPLES

1 through 151	Surface obsidian samples, mainly fragmentary flake blades, collected from La Venta site in February, 1968. Sequential numbers assigned as specimens were run on x-ray spectograph.
I.	From refuse deposits west of La Venta pyramid. Collected in July, 1967, by R. F. Heizer and P. Drucker. Test Pit No. 3, d. 8-16 in.
II.	Same as I.
III.	Same as I.
IV.	Stirling Group southeast of La Venta pyramid. Specimen found in gray gumbo packing of Drain No. 1. Collected February, 1968, by NGS-UC expedition.
V.	Same as IV.
VI.	Refuse deposits lying on top of large rectangular platform construction (shown on site map in this volume as "Great Platform") near southwest corner of the south platform of the La Venta pyramid. Test Pit No. 2, level 3 (d. 40-60 cm.). Dates from La Venta phase. Collected January, 1968, by NGS-UC expedition.
VII.	Same location as VI. Test Pit No. 1, level 8 (d. 140-160 cm.).
VIII.	Tlatelolco, Mexico. Flake blade found in mouth of Burial No. 1. Assignable to Aztec II-III period on basis of associated pottery. Collected by UC research group on February 15, 1968.
IX.	Comalcalco, Tab., Mexico. Surface obsidian chip collected February 7, 1967.
X.	Number not used.

XI - XX Ten obsidian samples recovered by P. Drucker from a test pit excavated in the cutbank of the Arroyo Hueyapan at the locus of his earlier Trench 26. Sequential numbers assigned as run on x-ray spectograph.

XXI. La Venta site. Test Pit 1968-1, level 6 (d. 100-120 cm.).

XXII. La Venta site. Test Pit 1968-2, level 7 (d. 120-140 cm.).

XXIII. La Venta site. Test pit 1968-2, level 8 (d. 140-160 cm.).

XXIV. La Venta site. Test Pit 1968-2, level 5 (d. 80-100 cm.).

XXV. La Venta site. Test Pit 1968-5, level 7 (d. 120-140 cm.).

XXVI. Tlatelolco, Mexico. Flake blade found in mouth of Burial 2. Assignable to Aztec II period on basis of associated pottery. Collected by UC research group on February 14, 1968.

Table 1. Summary of the appearance of five major obsidian types (in hand specimen)

Type A	Distinct olive green body color (to greenish-black in thicker sections). Commonly shows golden internal reflections from parallel discontinuous planes (incipient cracks?). Occasionally golden reflections are on a very fine (powdery) scale. Generally smooth fracture surfaces of high lustre. Fine cracks often visible running in curves perpendicular to conchoidal fracture rings or undulations. Occasionally small tan spherules or trains of spherules are visible.
Type B	Light gray, dark gray, to nearly black body color. Clear uniform smoky-gray color generally characteristic. Occasional faint darker gray streaking visible in light gray body color. Surface highly lustrous to somewhat greasy; occasionally faintly irridescent. Diverging curved cracks observed occasionally. Occasional spots; vesicles rare.
Type C	Light gray with distinct tan tint, particularly in thicker sections. Dense flecking of fine tan, brown, to black spots is characteristic. Areas of shadowy gray streaking or banding due to concentration of fine spots is common, more obvious when viewed parallel to plane of spots. May be very light gray to clear in thinnest sections. Surface usually greasy in lustre due to roughness related to dense flecking. Lustrous surface only when flecking is on finest scale.
Type D	Dark gray to black with streaky appearance. Dense irregular mottling of dark gray in lighter gray background. Surface shiny to pitted (with a greasy lustre).
Type E	Light smoky-gray with greenish-yellow tint. Clear to greenish-gray in thinner sections. Faint banding on fine scale. Very fine spotting gives dusty internal appearance; occasional larger spots of rust coloring. Faint banding becomes more distinct on rotation of sample to certain orientations. Surface generally highly lustrous, occasionally pearly.

Table 2. Summary of Data for Obsidians of TYPE A
(1.0 equivalent to 20 counts per second)

Sample Number	Rb	Sr	Y	Zr	Nb	Σ(Rb,Sr,Zr)	Rb/Σ	Sr/Σ	Zr/Σ	Total
7	23.5	1.0	15.0	146.0	10.5	170.5	.138	.006	.856	1.000
8	24.0	0.5	17.5	146.5	13.0	171.0	.142	.003	.855	1.000
9	24.0	0.5	16.5	150.0	14.0	174.5	.137	.003	.860.	1.000
10	24.0	0.5	14.5	149.0	14.0	173.5	.138	.003	.859.	1.000
11	25.0	1.0	16.5	152.5	17.0	178.5	.140	.006	.854	1.000
12	25.5	1.0	14.5	151.5	14.5	178.0	.142	.007	.851	1.000
13	16.5	3.0	14.5	114.5	19.5	134.0	.122	.022	.857	1.001
14	21.0	0.5	14.5	146.5	17.5	168.0	.126	.005	.869	1.000
15	23.0	0.5	14.0	145.0	13.5	168.5	.136	.004	.860	1.000
16	21.0	0.5	15.0	144.0	12.5.	165.5	.128	.005	.867	1.000
17	24.5	0.5	15.5	151.5	13.0	176.5	.140	.003	.857	1.000
18	22.5	1.5	15.0	144.5	14.0	168.5	.134	.009	.858	1.000
19	23.0	0.5	16.0	144.0	13.0	167.5	.137	.003	.860	1.000
20	23.5	1.0	15.0	145.0	12.5	169.5	.139	.006	.855	1.000
21	23.0	0.5	15.0	146.5	14.0	170.0	.135	.003	.862	1.000
22	21.0	1.0	16.5	140.0	13.0	162.0	.130	.006	.864	1.000
23	23.5	0.5	15.0	145.0	13.0	169.0	.139	.003	.858	1.000
24	21.5	0.5	16.5	146.5	10.5	168.5	.128	.003	.869	1.000
25	22.0	0.5	17.5	152.5	13.5	175.0	.126	.003	.871	1.000
26	22.0	0.5	15.0	140.0	12.5	162.5	.135	.003	.862	1.000
27	22.0	1.0	15.0	140.0	12.5	163.0	.136	.003	.861	1.000
28	22.0	1.0	15.0	140.0	12.5	163.0	.135	.006	.859	1.000
29	23.0	0.5	15.0	139.0	11.5	162.5	.142	.003	.855	1.000
146	22.0	1.5	15.0	139.5	13.5	163.0	.135	.009	.856	1.000
III	25.5	0.5	15.5	150.5	15.5	176.5	.143	.003	.853	.999
VIII	23.0	1.0	16.0	147.5	15.0	171.5	.134	.006	.860	1.000
XXI	23.0	1.0	16.5	141.5	15.0	165.5	.139	.006	.855	1.000
XXV	23.0	1.0	16.0	140.0	13.5	164.0	.140	.006	.854	1.000
XXVI	24.5	1.5	15.0	142.5	15.0	168.5	.145	.009	.846	1.000
Average of 24	22.63	0.83	15.40	144.15	13.54	(La Venta surface samples)				
ppm	251	7	124	1164	109	Standard: G-1				

For comparison the following data are given for samples from northwest Nevada:

Hu X-1	23.0	0.5	11.0	85.0	5.5	108.5	.212	.005	.783	1.000
Hu X-2	24.0	0.5	12.5	90.0	5.5	114.5	.210	.004	.786	1.000

Table 3. Summary of Data for Obsidians of TYPE B
(1.0 equivalent to 20 counts per second)

Sample Number	Rb	Sr	Y	Zr	Nb	Σ(Rb,Sr,Zr)	Rb/Σ	Sr/Σ	Zr/Σ	Total
2	19.5	1.0	6.0	33.0	7.5	53.5	.364	.019	.617	1.000
30	19.0	1.0	7.0	30.5	7.5	50.5	.376	.020	.604	1.000
31	18.0	1.0	8.0	31.5	7.0	50.5	.356	.020	.624	1.000
34	18.5	2.0	10.0	33.0	6.5	53.5	.346	.038	.617	1.001
37	20.5	1.0	6.0	34.0	6.0	55.5	.369	.018	.613	1.000
42	20.5	1.0	6.0	32.0	8.5	53.5	.383	.019	.598	1.000
47	21.5	1.0	6.0	33.0	7.5	55.5	.387	.018	.595	1.000
49	20.5	1.0	8.0	32.5	8.0	54.0	.380	.019	.602	1.001
50	20.5	1.0	7.5	32.5	6.5	54.0	.380	.019	.602	1.001
53	23.0	0.5	7.0	34.5	8.5	58.0	.394	.010	.596	1.000
57	20.0	2.0	9.0	32.0	7.5	54.0	.370	.037	.593	1.000
58	20.0	1.0	9.0	32.5	7.0	53.5	.374	.019	.607	1.000
60	17.0	1.5	9.0	28.5	7.5	47.0	.362	.034	.603	.999
61	18.0	1.5	6.0	30.5	7.0	50.0	.355	.032	.613	1.000
63	20.5	1.5	9.0	31.0	6.5	53.0	.390	.024	.585	.999
64	20.0	0.5	7.0	31.0	6.5	51.5	.388	.010	.602	1.000
67	19.5	1.0	7.5	31.5	7.5	52.0	.375	.019	.606	1.000
71	21.5	0.5	7.5	32.5	8.5	54.5	.391	.011	.598	1.000
74	19.0	1.0	7.5	30.5	4.0	50.5	.376	.020	.604	1.000
79	19.0	0.5	8.0	32.0	7.0	51.5	.369	.010	.621	1.000
80	18.0	0.5	6.0	29.5	6.5	48.0	.375	.010	.615	1.000
81	20.5	1.0	8.0	31.0	6.5	52.5	.390	.019	.590	.999
82	19.5	1.5	5.5	29.5	6.5	50.5	.386	.030	.584	1.000
84	20.5	1.0	7.5	31.0	6.0	52.5	.390	.019	.590	.999
85	20.0	1.5	8.5	31.5	6.5	53.0	.377	.028	.594	.999
86	20.0	1.5	6.5	30.0	8.0	51.5	.388	.029	.583	1.000
87	19.0	1.5	8.0	30.5	7.0	51.0	.373	.029	.598	1.000
93	18.5	0.5	8.0	31.5	7.5	50.5	.366	.010	.624	1.000
94	19.0	0.5	7.5	31.0	7.0	50.5	.376	.010	.614	1.000
96	18.5	2.0	7.0	27.0	5.5	47.5	.389	.042	.568	.999
97	19.0	1.5	7.0	31.0	7.5	51.5	.369	.029	.602	1.000
98	19.0	1.5	8.0	30.0	7.0	50.5	.376	.030	.594	1.000
99	19.0	1.5	7.5	30.0	6.5	50.5	.376	.030	.594	1.000
100	17.0	1.5	6.5	29.0	6.0	47.5	.358	.032	.610	1.000
101	20.5	1.5	9.5	31.5	7.0	53.5	.383	.028	.589	1.000
102	20.5	1.5	7.0	31.0	8.5	53.0	.388	.031	.582	1.001
103	20.5	1.0	6.5	30.5	6.5	52.0	.394	.019	.587	1.000
106	19.0	1.0	6.0	31.0	7.5	51.0	.377	.016	.607	1.000
108	18.5	0.5	6.5	29.5	8.0	48.5	.381	.010	.608	.999
109	20.5	1.0	8.5	32.0	8.0	53.5	.383	.019	.598	1.000
110	22.0	2.0	8.0	30.5	6.5	54.5	.404	.037	.560	1.001
113	21.0	1.5	7.5	31.5	7.0	54.0	.389	.028	.583	1.000
114	19.5	1.0	7.0	31.0	7.5	51.5	.379	.019	.602	1.000
115	20.0	0.5	7.0	31.5	7.5	52.0	.385	.010	.606	1.001
116	19.0	0.5	6.5	30.5	6.5	50.0	.380	.010	.610	1.000
118	20.5	1.5	7.0	31.5	7.0	53.5	.381	.031	.588	1.000
120	20.0	1.0	7.5	30.0	6.5	51.0	.392	.020	.588	1.000
122	19.0	2.0	6.5	28.5	6.5	49.5	.384	.040	.576	1.000
124	19.0	1.5	8.0	31.0	5.5	51.5	.369	.029	.602	1.000
126	22.0	2.0	8.0	33.0	6.5	57.0	.386	.035	.579	1.000

Table 3. continued

Sample Number	Rb	Sr	Y	Zr	Nb	Σ(Rb,Sr,Zr)	Rb/Σ	Sr/Σ	Zr/Σ	Total
127	20.0	1.0	6.5	30.5	7.5	51.5	.388	.019	.592	.999
129	19.5	2.0	7.0	27.0	7.0	48.5	.403	.042	.556	1.001
131	21.0	0.5	6.5	34.0	8.5	55.5	.377	.009	.613	.999
133	19.0	1.5	7.5	30.0	7.0	50.5	.376	.030	.594	1.001
134	19.5	0.5	7.5	31.5	7.0	51.5	.379	.010	.612	1.001
135	19.5	2.0	8.0	32.0	7.0	53.5	.364	.037	.598	.999
142	19.0	2.0	9.0	31.0	7.0	52.0	.365	.038	.596	.999
143	22.0	1.0	9.0	34.0	6.5	57.0	.386	.018	.596	1.000
145	19.0	2.0	6.0	27.5	7.5	48.5	.392	.041	.567	1.000
147	21.0	1.5	7.0	30.5	7.0	53.0	.396	.028	.575	.999
148	19.5	1.5	7.5	30.5	7.5	51.5	.379	.029	.592	1.000
150	21.5	1.5	6.5	30.5	9.0	53.5	.402	.028	.570	1.000
VI	20.0	1.5	8 5	34.5	9.0	56.0	.357	.027	.616	1.000
XVIII	19.5	2.0	6.5	31.5	7.0	53.0	.368	.038	.594	1.000
XX	19.5	1.5	7.0	28.5	7.0	49.5	.394	.030	.576	1.000
XXIV	17.5	1.0	6.5	30.5	7.0	49.0	.357	.020	.622	.999
Average of 62	19.77	1.23	7.38	31.04	7.06					
ppm	220	11	60	251	57	Standard: G-1				

Table 4. Summary of Data for Obsidians of TYPE C
(1.0 equivalent to 20 counts per second)

Sample Number	Rb	Sr	Y	Zr	Nb	Σ(Rb,Sr,Zr)	Rb/Σ	Sr/Σ	Zr/Σ	Total
32	14.5	22.0	2.5	16.0	1.5	52.5	.276	.419	.305	1.000
33	13.5	24.5	3.5	15.5	015	53.5	.252	.458	.290	1.000
35	13.5	24.0	2.0	17.0	1.5	54.5	.248	.440	.312	1.000
36	14.0	24.0	1.5	16.5	1.0	54.5	.257	.440	.303	1.000
38	12.5	21.5	2.5	15.0	0.5	49.0	.255	.439	.306	1.000
39	14.0	26.0	3.5	14.0	0.0	54.0	.259	.481	.259	.999
40	13.5	23.0	2.0	15.0	3.0	51.5	.262	.447	.291	1.000
43	14.5	26.5	2.5	17.0	0.5	58.0	.250	.457	.293	1.000
44	14.5	26.0	2.0	16.0	0.5	56.5	.257	.460	.283	1.000
45	12.5	22.5	2.5	17.0	1.0	52.0	.240	.433	.327	1.000
46	14.0	24.0	1.5	18.0	2.0	56.0	.250	.429	.321	1.000
48	13.0	26.5	1.5	15.5	2.5	55.0	.236	.482	.282	1.000
51	12.0	24.0	4.0	17.0	0.5	53.0	.231	.451	.319	1.001
55	15.0	25.0	4.0	18.0	1.0	58.0	.255	.434	.311	1.000
59	12.5	25.5	4.0	18.0	1.5	56.0	.226	.452	.321	.999
62	13.5	22.0	1.5	19.0	3.5	54.5	.245	.404	.351	1.000
66	14.5	23.5	5.0	16.0	0.5	54.0	.269	.435	.296	1.000
68	13.0	24.5	2.5	16.0	2.0	53.5	.244	.462	.295	1.001
69	13.5	24.0	2.5	17.5	2.5	55.0	.245	.436	.318	.999
72	12.0	25.0	3.0	15.5	1.0	52.5	.127	.477	.295	.999
73	13.5	22.5	4.0	16.0	1.5	52.0	.256	.436	.308	1.000
76	13.0	24.0	3.0	17.0	3.0	54.0	.241	.444	.315	1.000
77	12.5	24.5	2.5	12.0	2.5	49.0	.256	.500	.244	1.000
91	13.5	25.5	2.0	18.0	2.5	57.0	.237	.447	.316	1.000
92	13.0	23.0	3.0	14.5	1.5	50.5	.257	.455	.287	.999
95	13.5	23.0	3.0	17.5	2.5	54.0	.250	.426	.324	1.000
104	13.0	24.0	2.0	14.0	2.0	51.0	.255	.471	.275	1.001
105	12.5	24.0	3.0	15.0	3.5	51.5	.243	.466	.291	1.000
107	13.0	21.0	2.5	15.5	2.0	49.5	.263	.424	.313	1.000
111	13.0	22.5	2.5	16.0	2.0	51.5	.252	.437	.311	1.000
112	13.0	23.5	2.5	15.5	2.5	52.0	.250	.452	.298	1.000
119	13.5	23.0	3.0	14.5	2.0	51.0	.264	.448	.287	.999
121	13.5	23.5	3.0	17.0	1.5	54.0	.252	.437	.311	1.000
125	13.0	23.0	3.5	17.5	2.5	53.5	.243	.430	.327	1.000
128	14.5	25.0	2.0	17.5	3.0	57.0	.254	.439	.307	1.000
130	13.5	24.0	3.0	14.0	2.0	51.5	.262	.466	.272	1.000
132	11.5	22.0	2.5	16.0	2.0	49.5	.232	.444	.323	.999
136	13.0	21.5	2.5	16.5	2.0	51.0	.255	.422	.324	1.001
137	12.0	22.0	1.0	14.5	2.5	48.5	.247	.454	.299	1.000
138	14.0	23.0	3.0	17.5	1.0	54.5	.257	.422	.321	1.000
139	13.0	24.5	3.5	15.0	2.5	52.5	.248	.467	.286	1.001
141	15.0	24.5	2.5	15.0	2.0	54.5	.275	.450	.275	1.000
144	12.5	21.5	2.5	16.0	2.0	50.0	.250	.430	.320	1.000
149	14.0	23.5	1.5	16.5	1.0	54.0	.259	.435	.306	1.000
I	14.0	25.0	0.5	15.5	2.5	54.5	.257	.459	.284	1.000
II	13.5	25.0	2.5	17.0	2.0	55.5	.243	.450	.306	.999
IV	15.0	26.5	3.0	16.5	2.5	58.0	.259	.457	.284	1.000
V	14.0	26.0	2.5	19.5	3.0	59.5	.235	.437	.328	1.000
XXII	14.0	24.0	2.5	15.0	1.5	53.0	.264	.453	.283	1.000
XXIII	14.0	22.5	1.5	15.5	2.0	52.0	.269	.433	.298	1.000
Average of 44	13.33	23.69	2.67	16.09	1.78					
ppm	148	212	22	130	14					

Standard: G-1

Table 5. Summary of Data for Obsidians of TYPE D
(1.0 equivalent to 20 counts per second)

Sample Number	Rb	Sr	Y	Zr	Nb	Σ(Rb,Sr,Zr)	Rb/Σ	Sr/Σ	Zr/Σ	Total
6	16.5	4.5	4.5	30.0	3.0	51.0	.324	.088	.588	1.000
56	16.5	4.5	5.0	27.5	2.0	48.5	.341	.088	.571	1.000
151	17.0	4.0	5.0	27.5	3.5	48.5	.350	.082	.567	.999
XI	15.5	3.5	4.0	28.5	5.0	47.5	.326	.074	.600	1.000
XII	17.5	3.5	3.0	30.0	3.0	51.0	.343	.069	.588	1.000
XIII	16.5	4.0	3.0	30.0	2.5	50.5	.327	.079	.594	1.000
XIV	17.0	5.0	5.0	29.0	4.0	51.0	.333	.095	.571	.999
XV	17.0	4.0	4.0	30.0	3.5	51.0	.333	.078	.588	.999
XIX	16.0	4.0	5.5	28.5	2.0	48.5	.330	.082	.588	1.000
Average of 3	16.65	4.33	4.83	28.33	2.83					
Average of all 9	16.61	4.11	4.33	29.00	3.17					
ppm	185	37	35	234	26					

Table 6. Summary of Data for Obsidians of TYPE E
(1.0 equivalent to 20 counts per second)

Sample Number	Rb	Sr	Y	Zr	Nb	Σ(Rb,Sr,Zr)	Rb/Σ	Sr/Σ	Zr/Σ	Total
41	12.5	3.5	3.0	8.0	2.0	24.0	.521	.146	.333	1.000
65	12.5	4.0	2.5	7.5	1.5	24.0	.521	.167	.313	1.001
75	12.5	6.0	2.0	8.0	2.5	26.5	.472	.226	.302	1.000
78	12.5	2.5	2.5	7.0	3.0	22.0	.568	.114	.318	1.000
83	11.5	3.5	1.5	8.0	4.0	23.0	.500	.152	.348	1.000
88	13.0	3.5	2.5	9,0	3.5	25.5	.510	.137	.353	1.000
90	12.5	5.5	2.0	7.0	5.0	25.0	.500	.220	.280	1.000
123	13.0	4.0	3.5	8.0	2.5	25.0	.520	.160	.320	1.000
140	12.0	4.0	2.5	8.5	2.5	24.5	.490	.163	.347	1.000
Average of 9	12.44	4.06	2.44	7.89	2.94					
ppm	138	36	20	64	24	Standard: G-1				

Table 7. Summary of Data for Obsidians Not Belonging to Five Dominant Types
(1.0 equivalent to 20 counts per second)

Sample Number	Rb	Sr	Y	Zr	Nb	Σ(RB,Sr,Zr)	Rb/Σ	Sr/Σ	Zr/Σ	Total
1	< 1	< 1	< 1	< 1	< 1	< 2				
54	11.5	9.5	1.5	11.0	3.0	32.0	.359	.297	.344	1.000
XVI	10.5	7.5	2.5	9.5	2.0	27.5	.382	.273	.345	1.000
XVII	15.0	11.0	3.5	14.0	2.0	40.0	.375	.275	.350	1.000
3	17.5	2.5	3.0	17.5	3.5	37.5	.467	.067	.467	1.001
52	17.5	3.0	4.0	18.5	3.5	39.0	.449	.077	.474	1.000
	(Cf El Chayal)									
70	16.5	19.0	3.0	15.0	3.5	50.5	.327	.376	.297	1.000
117	17.0	19.0	2.5	16.0	3.5	52.0	.330	.363	.308	1.001
VII	18.5	21.0	4.0	15.5	0.5	55.0	.336	.382	.282	1.000
IX	17.5	19.5	2.5	15.5	1.0	52.5	.333	.371	.295	.999
	(Cf Ixtepeque)									
4	14.0	16.0	3.0	20.5	1.5	50.5	.277	.317	.406	1.000
5	16.5	18.5	2.5	22.5	1.5	57.5	.287	.322	.391	1.000
89	11.5	22.5	3.5	31.0	3.0	65.0	.177	.346	.477	1.000
Pachuca (Cf Type A, Table 2)										
	22.5	0.5	15.5	137.5	12.5	160.5	.140	.003	.857	1.000
El Chayal										
	15.5	16.5	2.5	14.5	2.0	46.5	.333	.355	.312	1.000
Ixtepeque										
clear	12.5	17.5	3.0	24.0	1.5	54.0	.231	.324	.444	.999
flow-banded	13.0	21.5	2.5	24.5	1.0	59.0	.220	.364	.415	.999
U.S.G.S. Standard Granite G-1										
	19.5	27.0	2.0	25.5	1.0					
	20.0	29.0	1.5	27.5	4.5					
	20.0	28.0	2.5	25.0	2.5					
Average G-1	19.8	28.0	2.0	26.0	2.7					
ppm	220	250	13	210	20					

Bibliography

Berger, Rainer, J. A. Graham and R. F. Heizer
1967 A Reconsideration of the Age of the La Venta Site. Contributions of the University of California Archaeological Research Facility, No. 3:1-24, Berkeley.

Boggs, Stanley H.
1950 "Olmec" Pictographs in the Las Victorias Group, Chalchuapa Archaeological Zone, El Salvador. Carnegie Institute of Washington, Notes on Middle American Archaeology and Ethnology, 99:85-92, Washington, D.C.

Coe, M. D., and K. V. Flannery
1964 The Pre-Columbian Obsidian Industry of El Chayal, Guatemala. American Antiquity, 30: 1:43-49.

Drucker, Philip
1952 La Venta, Tabasco. A Study of Ceramics and Art. Bureau of American Ethnology, Bull. 153. Washington, D.C.

Jack, R. N., K. R. Lajoie and I. S. E. Carmichael
1967 "Finger-Printing" of Obsidian and Pumice from the Western United States. Proceedings 80th Annual Meeting Geological Society of America, New Orleans, La., Nov. 20-22, 1967 (p. 107).

Thompson, J. E. S.
1943 Some Sculptures from Southwestern Quetzaltenango, Guatemala. Carnegie Institute of Washington, Notes on Middle American Archaeology and Ethnology, No. 17, Washington, D.C.

Weaver, J. R. and F. H. Stross
1965 Analysis by X-Ray Fluorescence of Some American Obsidians. Contributions of the University of California Archaeological Research Facility, No. 1:89-103, Berkeley.

VI. NOTES ON THE PAPALHUAPA SITE, GUATEMALA

John A. Graham and Robert F. Heizer

In January, 1965, we were in Guatemala with our colleague, Dr. Howel Williams of the University of California Department of Geology and Geophysics, Berkeley. Dr. Williams had earlier noted an extensive deposit of obsidian near the village of Papalhuapa and we were anxious to visit the area to learn whether there was evidence of prehistoric industrial workshops there. We were fortunate enough to have available from the Comisión Cartografía of the Government of Guatemala a U.S. weapons carrier, a driver, and the company of Ing. Jorge Godoy with whom to make the inspection visit. Our sojourn was very brief, largely because of the unsettled conditions in the area, and for this reason our information on the natural obsidian deposit, the extent of the aboriginal workshop areas, and of the nearby archaeological site called locally the "Templo de Montezuma," which lies within the present village of Papalhuapa, is very meager. We were able to make a rough map of the ruins (fig. 1) and to make a small collection of workshop materials which we here describe. It was our intention to return in 1966 to excavate the Papalhuapa site, but the political situation has become worse each year, and since there is at present no prospect of being able to carry out further work, we are placing our observations on record.*

The modern village of Papalhuapa (population of ca. 500 ladinos) lies off the main road leading from Jutiapa to Chiquimula. One turns off to the south at Agua Blanca and follows what can barely be described as a road, passable only to four-wheel-drive vehicles, and proceeds for about 7 km. to the village (maps 1 and 2).

The site was first described by Azurdia (1927) who visited the ruins in 1926, having been informed of their existence while staying on the hacienda of Santo Domingo de Papalhuapa. Azurdia dug into several structures, but unfortunately he does not provide us with details of his exploration. He mentions a jaguar sculpture which is almost certainly the one seen by us (pl. 2), as well as three other sculptures reported to be incorporated in the masonry wall

*We wish to acknowledge the assistance of Miss Sonia Ragir of the Dept. of Anthropology in the work of classifying and describing the obsidian materials, and of Mr. Eugene Prince of the Lowie Museum of Anthropology who photographed these for us. Our trip was financed by the Committee on Research of the University of California, Berkeley, and by the National Geographic Society.

of a house foundation. His most important discovery seems to have been two stone yokes which he encountered in the excavation of some structure as yet unidentified, but probably the "Acropolis." Villacorta (1930) derived his account of the ruins from the report of Azurdia.

In 1937, Harry E. D. Pollock, attached to the Carnegie Institute staff, visited the Papalhuapa ruins for a few hours, but informs us that there is nothing in his notes which would amplify our own observations. G. Stromsvik and G. Espinosa apparently did not visit the Papalhuapa site during their explorations of the site of Asunción Mita, some 14 km. to the southwest (Stromsvik 1950).

The main architectural feature of the site is a large square platform or acropolis with sloping, boulder-faced sides. Its dimensions are 200 feet N-S and 210 feet E-W, and it stands 18 feet above the surrounding land level. Its interior construction features are not known, but it appears to have been built of a dumped rubble of small stones and earth. Several structures were built on the top of this large platform. On the west edge one can make out three much dilapidated mounds, the central one of which was a structure enclosing a corbel vaulted room whose eastern wall has fallen. Whether the structures on either side also contained vaulted rooms cannot be told from their present appearance. Along about two-thirds of the northern edge of the Acropolis surface is a pair of platforms, the easternmost of which is lower than its neighbor on the west. Stairs face the southern sides of this double platform. The eastern edge of the Acropolis top has what appears to be a single platform running along its whole length. The southern edge of the surface has no apparent structures, and there is an opening 45 feet wide which is oriented directly toward the Volcan Cerro Gordo on the northern side of the Acropolis. No approach stairway or ramp was observed by us, but it would seem probable that one existed on the north slope of the Acropolis.

About 300 feet south of the northeast corner of the Acropolis is a modern wooden house which is built on a dry stone foundation wall which is said to contain three stone sculptures found beneath the surface on this spot. A fourth sculpture escaped the fate of the other three. It is in the form of a jaguar (pl. 2) and is described below. This spot is indicated as "B" on Figure 1.

Two hundred and fifty feet south of "B" is a ball court ("C" in fig. 1) consisting of two low platforms, each 21 feet wide and 63 feet long. The space between the two mounds is 19 feet wide. The west mound stands 6 feet high, and the east one stands 4.5 feet. Here we found the tenoned stone head of a parrot (pl. 1) which is interpreted as a court marker.

About 150 feet southeast of the ball court is a low right-angled wall made of slightly trimmed basalt boulders ("D" on fig. 1). The interior of this low enclosure consists of almost pure obsidian debitage (flakes and cores). It was apparently a restricted workshop area.

Across a low wash about 150 feet to the southeast of the obsidian-filled enclosure are a series of four earth mounds ("F" - "I" on fig. 1), most of which have been dug into, presumably in search of treasure. One of these mounds covers a corbel vaulted room which we took to be a tomb. Whether the other mounds also cover masonry rooms cannot be determined until excavations are made. Two other such mounds ("E" and "J" in fig. 1) may be tombs or small platform structures.

It is our belief that the architecture at the Papalhuapa site dates from the Late Classic. While much smaller than the nearby site at Asunción Mita, the use of laja masonry and the presence of wall niches (noted in 1937 by Pollock and referred to by Stromsvik, 1950) constitute identical traits at the two sites. To these parallels we can add yokes, corbel vaulted rooms, absence of corbel spring in vault construction and tenoned parrot sculpture (ball court marker), ball court, and acropolis-type platform. Stromsvik (1950) dates the major period of architectural activity at Asunción Mita to the Classic period, apparently on the basis of the architecture and presence of Copador ware. We were not able to make ceramic collections at Papalhuapa and thus cannot compare the two sites.

The exposed central area surface of the Acropolis structure at Papalhuapa is covered with a layer, one to two feet thick, of obsidian debitage. It seems improbable that such workshop debris would have accumulated while the structure was in use, and our guess is that this refuse post-dates the abandonment of the Late Classic(?) Acropolis and that the obsidian refuse is evidence of Post Classic activity.

About one kilometer due northeast of the Papalhuapa site is a fairly steep-sided hill. This is an extinct volcano with a freshwater lake (Laguna de Obrajuelo) inside (pl. 1). This lake was anciently (and recently, until a well was drilled in the town) the source of all water during the dry season for the inhabitants of Papalhuapa. There is little doubt that the reason for the location of the Papalhuapa site is the proximity to this source of water.

The great natural deposit of obsidian occurs in the Volcan Ixtepeque. This has been studied geologically by Williams, McBirney and Dengo (1964), from whose report we reproduce the geological map of the area (map 2). We made a hurried visit to the western end of this mountain and saw everywhere an abundance of obsidian workshop debris. The small village of Quequexque is situated about one mile to the north. Some unusually large cores were col-

lected, one of which (pl. 7) was saved for detailed study. Three large parallel-sided blades were also picked up at the same workshop area.

From the area immediately west of the Acropolis (fairly open except for scattered houses) we made a collection of worked obsidian pieces. These are here described, and are illustrated in Plates 3, 4, 5, and 6.

Workshop Material from Base of West End of Ixtepeque, Near Quequexque

Three pieces were collected at this quarry and workshop site, one very large blade core (pl. 7) and three large parallel-sided blades. The large core and blades were found in association and numerous others were seen littering the area of the quarry-workshop area. The initial preparation of the obsidian prismatic cores and the concomitant production of large parallel-sided blade blanks apparently took place at the quarry. The prismatic cores and large blades were subsequently taken to the Papalhuapa site for further work: the cores for the manufacture of razor-like prismatic blades[1] and the large blades for the production of bifacially-worked ceremonial knives.

The material of the large pyramidal core is the glassy obsidian from which all the artifacts and waste are made. It weighs 11 pounds and is 8 inches long and 6 by 5 inches in diameter. The core tapers from the flat striking platform to its tip. Small ribbon-like flakes have been pressed from the tip and are evidence of the core resting on this apex while being worked. Large semi-parallel-sided blades have been removed all around the core from a flat, unfaceted platform, either the original surface of the quarried block or a fracture produced by controlled heating as described below. The platform shows no evidence of artificial preparation at this stage of work. At a later stage, when their size has been reduced, the prismatic cores show deliberate scratching or roughening of the platform, probably to keep the punch from slipping. The fact that the platform is unprepared, the irregularity of the blades removed, and the size of the negative bulb lead us to think that a chest punch was not used at this stage of manufacture. Rather the core was worked instead, either by indirect percussion (soft punch), using a bone or wood punch and a stone hammer, or by direct percussion, with a large bone or antler hammer. It is also possible that a hammerstone was employed to detach the large blades.

---

[1] Aztec obsidian blade manufacture was described firsthand by Torquemada in 1616 (transl. in Kidder, Jennings and Shook 1946:135), Motolinia (ibid. 135-136), Hernandez in 1580 (Barnes 1947), and Kidder (1947:20); and has been discussed by Mená (1913), Semenov (1964:46-47), MacCurdy (1900), Courtis (1865), Barnes (1947), and Epstein (1964).

Such hammerstones are abundant in the workshop area. They are basalt and andesite spheroidal stream cobbles, probably secured from the bed of the Río Ostúa about 5 miles to the west. They range in diameter from 3 to 8 inches. Many of these exhibit signs of use as hammerstones.

Three large semi-parallel-sided blades (not illustrated) were collected at the quarry workshop in association with the large core. They are between 5.75 and 6.50 inches long, 2.0 to 2.5 inches wide, and 0.75 inch thick. The striking platform is unfaceted and unprepared by roughing. The bulb is prominent but diffuse; two of the flakes have large bulbar scars. Their sides and ends are severely crushed, probably because of being walked upon and joggled on the heavily littered surface. The dorsal faces of these large blades usually show three ridges. The blades were struck on a point which places one ridge directly on the line of the blow. This medial placement of the ridge adds the necessary strength to allow a long thin piece to be removed from the core.

Obsidian Workshop Material from Templo de Montezuma, Papalhuapa

There are seven complete prismatic blade cores without secondary utilization (pl. 6d-i). These are presumed to represent exhausted nuclei which were thrown away as being of no further utility. The striking platform is plain with deliberate scratching or roughening (parallel scratches in one or more directions) around the edge of the platform. The length ranges from 4.5 to 6.0 inches; the width (in most cases the diameter of the striking platform is the widest point) is from 0.75 to 1.75 inches. The cross section is elliptical, one side usually being slightly flatter than the others. There is rarely evidence of crushing on the tip of the core (the end opposite the striking platform), which is strong evidence that the tip did not rest on the ground while the core was being worked. It was perhaps rested on or jammed into a wooden block or anvil. The largest of the prismatic cores has most of the striking platform accidentally removed (probably an erratic punch below), and two blade scars end abruptly in hinge fractures at pumice inclusions, rendering it useless (pl. 6f). Two of the smaller cores show erratic blade scars probably due to misapplication of punch or pressure. The striking platform of the smallest of the cores (pl. 6d) is almost entirely worked away.

Two prismatic cores show secondary battering and were probably used as hammerstones (pl. 6a,c). In the specimen shown in Plate 6a, the battered area appears as a compacted white shattered area slightly below the center of the core cylinder on one side along one of the ridges caused by the intersection of two negative blade scars. The striking platforms of these cores also show signs of deliberate roughening; there is no apparent crushing of the tip. The largest of these is 5.25 inches long and 1.50 inches in diameter.

The crushed area occurs 1.50 inches from the striking platform, runs for approximately 2 inches, and is 0.50 inch at the widest point. The smaller one shows several erratic flake scars. One of the flake scars has completely removed the striking platform. It is 2.75 inches long and 0.75 inch in diameter. The edge of the irregular flake scars shows battering for a distance of 1.50 inches. The third hammerstone (pl. 6b) is not on a prismatic core. It was originally either one of the primary blade blanks, or a portion (an erratic blade) of a larger prismatic core, or a large blade from which some smaller blades were removed. There are six scars made by the removal of prismatic blades on the dorsal face, making the latter interpretation most probable. There are apparent attempts to thin the blade on the ventral surface in the manufacture of thin blades or knives. Three wide, long, wavy flakes were removed, but the attempt was apparently unsuccessful and was abandoned. One edge is completely crushed in the same manner as the two cores described above. The striking platform has been removed, one end is a hinge fracture and the other shows a part of a wide flake scar. The implement is 4.0 inches long, 1.25 inches wide, and 1.0 inch thick.

There are three prismatic blade cores whose tip ends are crushed. As these cores were not worked resting on the ground, but with the sides held firmly by some kind of clamp, such crushing could occur only secondarily. They may also be hammerstones with only the tips rather than the sides being used, either for the fluted secondary retouch on the ceremonial knives or in an intermediate punch technique (used to hit a bone, antler, or wood punch to remove blades). Mr. D. Crabtree of Idaho, who has worked extensively on the techniques of manufacture of punch blades and physical properties of various raw materials, has suggested that the tips of exhausted cores might have been used in the core preparation to score the platform and allow the blade to be peeled off with the punch, rather than struck off by force. A polished surface is, according to Mr. Crabtree, stronger and more resistant to pressure than a scratched or scored one.

Thirteen broken fragments of prismatic blade cores show two distinct types of fracture. The first kind of fracture (8 specimens) is perpendicular to the long axis of the core. The break shows no flake scar and is usually completely without a bulb; only one shows what may be a bulbar scar, and this may also be interpreted as a flake removed later. There is, therefore, no evidence of a direct blow to shear the cores transversally. Three of these eight specimens show slight hinge fracture on one side. Five of the cores show crushing along one or two sides (cf. pl. 6c), as in the cores utilized as hammerstones, although here it is usually slight. Five of these fragments with perpendicular fracture are the tip ends of cores, only two having striking platforms, and one is fractured at both ends (giving an example of a different kind of fracture at each end). It is possible that the perpendicular fracture occurred during use of the

piece as a hammerstone and that the core snapped during the shock of use, cracking near the tip where the cylinder thins. But because only three specimens show conclusive evidence of battering, a second explanation (again suggested by Mr. Crabtree) may be entertained. It seems possible that these cores were fractured to obtain a new platform in order to continue to remove the razor-like blades after the original platform became impossible to work (cf. pl. 6d,f,i). The kind of flat fracture necessary can be obtained in two ways: by grinding, as is seen on many cores from Mexican sites; and by heat fracture. Several of the Guatemalan cores show a single constriction, a raised ring which extends all around the fracture, about one-eight to one-quarter inch from the edge of the platform. This constriction, the absence of a bulb of percussion, the lack of concentric rings, and the almost perfect flatness of the remaining surface all strongly support the theory that the break is the result of some kind of controlled thermal fracture. Mr. Crabtree postulates that this might be obtained by dipping a cord or string in resin, wrapping it around the core at the desired point, lighting the string - thereby heating the volcanic glass - and then plunging the core in cold water, perhaps helping the break with a sharp rap at the thin line of heating. This method is similar to the one used in the controlled breaking of glass bottles. The second kind of fracture, of which there are four examples (or five counting the specimen which shows both kinds of fracture), is broken diagonally across the length of the core in a contorted fashion. The break is associated in three cases with a wide, erratic flake scar, perhaps due to an error in the application of the punch while attempting to remove a blade. One flake scar continues down through the core and twists around in such a way as to remove the tip. Two small cores are irregularly worked into gouge-like implements. The tips of the cores are twisted off in the manner described above, and several erratic flake scars are found removed from the original striking platform. One core was subsequently flipped over and several unsuccessful blades were removed from the opposite end, forming a shallow notch or gouge on either end. A slip of the punch or the grip in which the core was held during the process of manufacture would cause the core to slip, the pressure to be misplaced, and an erratic flake to be removed. The misdirection of pressure, straight rather than downward and outward, would presumably be sufficient to cause the break to continue through the core and remove the tip.

One flake blade core is very small - about 2 inches long, 2 inches wide, and 1.75 inches thick. The platform is contorted, not from two blows but from some natural fracturing agent. Two flakes were struck off the platform although several more partial scars are present. It may be a tip end from a large core which broke off by some thermal action before it was worked down.

The large blades struck at the quarry were carried to this ceremonial

site where they were further worked into bifacially flaked knives or ceremonial blades. All stages of this working are represented in the eleven examples in the collection (pls. 3a-d, 5e,f). It is impossible to say how long they may have been originally. Even the largest is broken far short of its original length. Their present range in width is between 1.50 and 3.75 inches. Seven are broken, split close to the striking platform, with heavily abraded edges. Ten of the blades have large plain striking platforms. One platform is punctiform. The bulbs are large and diffuse, and all have bulbar scars. Five have multiple scars. There is an apparent decrease in the width which is not accompanied by a proportional diminution in length, as the cores are worked into narrower and narrower prisms.

Three large blade fragments of the kind shown in Plate 5e and 5f were collected. None of these exhibits a bulb. Two approach the prismatic parallel-sided blades described below.

Fragmentary prismatic blades are illustrated in Plates 4e-f and 5a-f. Such pieces were very abundant. At some point in the narrowing of the core, long parallel-sided prismatic blades began to be punched off. They are both snapped approximately in the middle. The width is about 0.5 inch and the length is 2.25 inches - probably close to 5.0 inches in its original form. There is some nibbling along the edges but it is not nearly so pronounced as in the blade blanks. The portion of the striking platform preserved on one terminus of each of these blades is plain, but the surface is covered with tiny parallel scratches in one or two directions. This scratching is even more noticeable on the exhausted prismatic cores all around the outside of the striking platform. The purpose of this roughening of the platform appears to have been to prevent the punch from slipping. All of the fragments have two parallel ridges running down either side of the dorsal face (pl. 5a,b,e,f). These beveled edges give the long thin blade the necessary strength which prevents it from snapping during manufacture and guide the preparation of the platform and placement of the punch.

The large blades are worked by a process of bifacial secondary retouch into long ceremonial knives. The secondary flakes removed are flat, wavy, long flakes usually associated with wood or bone cylinder hammer technique. No pressure flaking was found in our very small sample, but in light of evidence for the secondary use of cores for battering, it may be possible, although not very likely, that the used-up cores were the fabricators. The sequence from roughed-out blade to bifacially worked knife is almost complete in the surface collection. Most of the blades and finished knives broken during manufacture or during the final touches were probably discarded.

Only one completely finished blade was collected (pl. 3g,h). It is 6.0 inches long, 1.75 inches at the widest point, and 0.5 inch thick. It is shaped like an elongate laurel leaf with a lenticular cross section. It is bifacially worked all around with long, wavy flakes, except in the center of the ventral face which shows some of the original flake surface. One end is flaked to a point and the butt is narrowed, but flattened rather than round.

A second finished knife has the point broken off, but the butt is complete and this is also flattened (pl. 3ef). A third piece is still in roughout form and somewhat thick in comparison to the finished knife; this imperfection is a possible reason for its abandonment (pl. 4g,h).

Two seemingly finished pieces, apparently broken in the last stages of work, have been further retouched for subsequent use for some other purpose. On one the point has been truncated (pl. 4a,b); on the second (not illustrated) the point has been reworked to form a borer, while blunt shoulders were worked just above the broken base—possibly for hafting.

There are 28 base fragments of bifacially flaked knives in all stages of work; all of the more finished ones show flattening. There are 8 tip fragments. The breaks appear to occur roughly in the middle of the knife. Work seems to have been performed in the following progression: the butt was first trimmed and thinned on the ventral face; then the ridges were removed from the dorsal; butt and sides were now trimmed to the point; and finally the sides of the ventral face were trimmed. The center of the ventral face often escaped secondary retouching.

Finally there are two short quadrilateral flakes. The edges of one, which is 3.75 by 2.75 inches, and about 0.5 inch thick, are severely utilized, while the second (pl. 4k,l) is bifacially retouched into a semi-quadrilateral blank or scraper which is 4 by 3 inches, and 0.75 inch thick. Implements like these, sometimes called bifacial scrapers, are found traded throughout Mexico as blanks and are considered by us to be preforms destined to serve as trade items.

Stone Sculpture

In the village of Papalhuapa there is retained as a local curiosity a sculptured seated jaguar figure of black vesicular basalt (pl. 2). It is said to have been found about sixty years ago while excavating for a house foundation. Three such sculptures were discovered; the other two are imbedded in the wall foundations ("B" on fig. 1). The seated figure is 97 cm. high.

A tenoned parrot head (pl. 1) was given to us by a local resident. This was delivered to the Museo de Arqueología in Guatemala City. We assume that this piece was originally associated with the ball court ("C" on fig. 1), and served as a marker in the usual fashion. It is 20.0 cm. long, 9.5 cm. high, and 6.5 cm. thick. The tenon end has been broken off and bears a biconical pecked perforation 5.5 cm. in diameter at the opening and tapering to 2.0 cm. in diameter where the two holes meet.

No stelae are reported from this site.

This part of Guatemala is very poorly known archaeologically. Sites in the Middle Motagua Valley have been investigated and reported on by Kidder and Smith (1943). Here the main structures are mounds which cover vaulted chambers with long entrance passages (dromos) and which served as collective tombs used over a long period of time. Ball courts with long, narrow alleys with sloping benches and low vertical playing walls and closed ends are reported. Tenoned head markers are also reported.

At Asunción Mita, G. Stromsvik (1950) found a very large archaeological site consisting of four groups of structures (plus a great Acropolis structure one kilometer from Group D, which may be separate or a section of the Group D ruins). The ruins lie in an area about 3 km. E-W by 2 km. N-S. Obsidian workshop refuse is abundant here, but no details are provided by Stromsvik. The constructions at Asunción Mita are similar to the Acropolis at Papalhuapa, being solid masses of thin andesite plates (laja) set in a mud mortar. The stones of the Papalhuapa Acropolis are quite thin, being only 0.75 to 1.00 inch thick; those at Asunción Mita are apparently of the same material but are larger in size. We were told at Papalhuapa that a great exposure of pyroxene andesite occurs near Amatillo, about 8 km. to the northwest, and we suppose this locality may have also been the source of the construction materials of the Templo de Montezuma.

Tenoned heads representing parrots (or macaws), jaguars, and snakes, used as ball court markers set horizontally in the side walls, are reported from Copán, La Unión, San Pedro Pinula, from near Antiqua and Pueblo Viejo (Huehuetenango), Azacualpilla, Finca Pompeya, Kaminaljuyu, Asunción Mita, and sites in the Middle Motagua Valley (Stromsvik 1952; Borhegyi 1965; Smith 1961; Shook 1952).

The obsidian of the Ixtepeque source has been analyzed by x-ray fluorescence and the data are published and discussed in papers by Weaver and Stross (1965), Heizer, Williams and Graham (1965), and Stross et al. (this volume, pp. 59-79).

The very large amount of workshop refuse at the site of Papalhuapa and in the whole area of the lower slopes of the Volcan de Ixtepeque indicates, in our opinion, that this was the seat of a considerable industrial enterprise whose products were largely made for export. It is possible that Papalhuapa was a procurement center established by some Maya city lying at a considerable distance. The test of this theory, for which we freely admit we have no evidence, will lie in the excavation of the site and identification of Ixtepeque obsidian artifacts in other Maya sites.

Data presently in hand – and we are quite aware how few these are – point to Copán and the Middle Motagua sites as being most closely related. At this time the Asunción Mita-Papalhuapa sites represent the southeasternmost extension of a number of Classic Maya features. The archaeology of Copán suggests that Classic lowland Maya civilization as expressed in stelae, corbel-vaulted construction, polychrome pottery, and other traits, arrived there about A.D. 435 (9.0.0.0.0 in the Maya calendar). The Maya presence at Copán has been interpreted as the actual arrival of an elite from the main Petén area. Whether the principal architectural constructions at Papalhuapa and Asunción Mita represent a secondary "colonization" from Copán or some less dramatic diffusion, will become clearer upon excavation. The exact nature of the ties to the Copán site on the one hand and the Middle Motagua area on the other will be an important matter for study.

As to the ethnic identity of the Late Classic occupation at Papalhuapa, we can also suggest only possibilities. Place names such as Papalhuapa, Mita, Ixtepeque, and others of the region are Pipil. They are part of the basis for Stromsvik and Villacorta seeing a Pipil occupation of the region in late (Post-Classic?) times. Archaeological materials such as yokes also bear out this idea. Nevertheless, in spite of the Pipil place names, which are ancient, Miles (1965) believes this area to have been Pokoman in in the sixteenth century. Furthermore, she entertains the likelihood of Pokoman occupance of the Middle Motagua sites. We think it likely that Late Classic Papalhuapa may have been Pokoman-speaking.

Explanation of Illustrations

[Accession numbers are those of the Lowie Museum of Anthropology]

Map 1 — Region of Papalhuapa

Map 2 — Geologic reconnaissance map of part of southeastern Guatemala (From Williams, McBirney and Dengo 1964, fig. 2.)

Figure 1 — Plan of the ruins of Papalhuapa

Plate 1 — Top: Laguna de Obrajuelo (looking south), with village of Papalhuapa near upper center. Photo by S. Bonis

Bottom: Profile view and upper surface of the broken tenoned parrot head ball court marker from Papalhuapa. Length 20 cm.

Plate 2 — Seated jaguar sculpture, Papalhuapa. Height 97 cm.

Plate 3 — Obsidian bifacial knives and flake blades, Papalhuapa

a,b. 3-22967
c,d. 3-22966
e,f. 3-22970
g,h. 3-22968

Plate 4 — Obsidian bifacial knives and trading preforms, Papalhuapa

a,b. 3-22974
c,d. 3-22972
e,f. 3-22965
g,h. 3-22969
i,j. 3-22971
k-l. 3-22973

Plate 5 — Obsidian prismatic blades, Papalhuapa

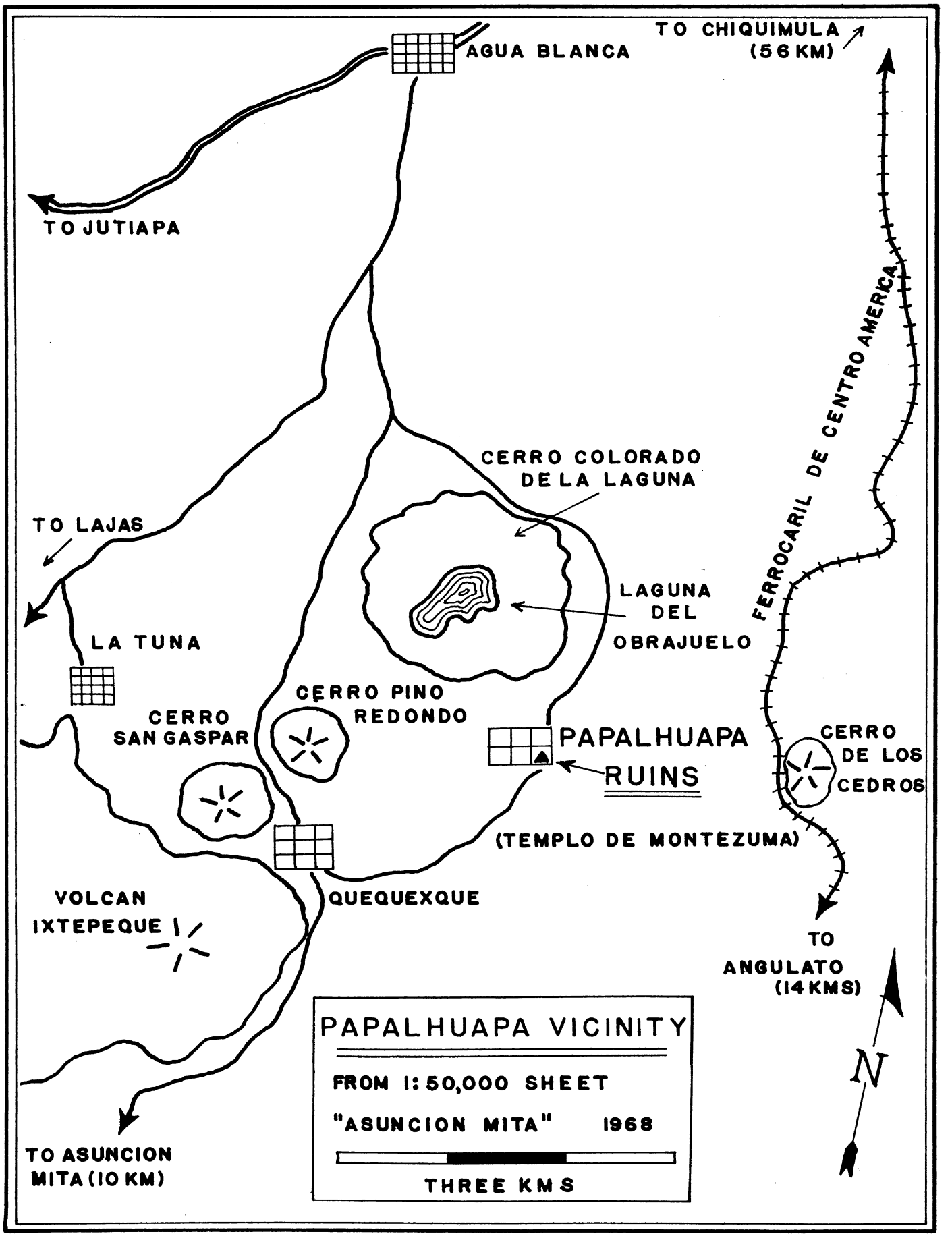
a,b. 3-22962
c,d. 3-22964
e,f. 3-22963

Plate 6 Obsidian polyfacetted cores, Papalhuapa

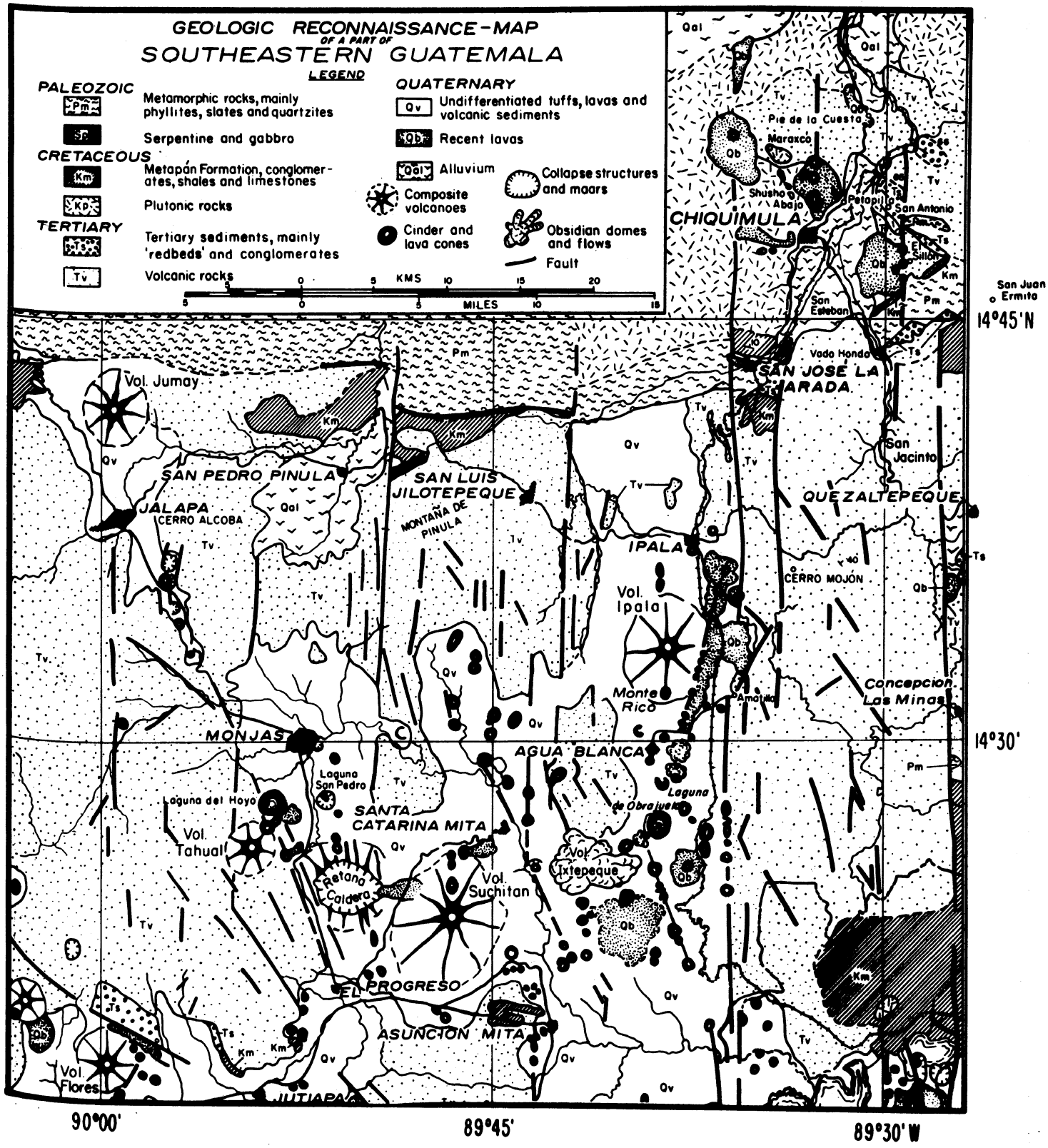
a. 3-22958
b. 3-22956
c. 3-22957
d. 3-22940
e. --
f. 3-22939
g. 3-22937
h. 3-22938
i. --

Plate 7 Profile and flat platform base of large obsidian blade core, Papalhuapa

a,b. 3-22934


AGUA BLANCA
TO CHIQUIMULA
(56 KM)
TO JUTIAPA
FERROCARIL DE CENTRO AMERICA
CERRO COLORADO
DE LA LAGUNA
TO LAJAS
LAGUNA
DEL
OBRAJUELO
LA TUNA
CERRO PINO
REDONDO
CERRO
SAN GASPAR
PAPALHUAPA
RUINS
CERRO
DE LOS
CEDROS
(TEMPLO DE MONTEZUMA)
VOLCAN
IXTEPEQUE
QUEQUEXQUE
TO
ANGULATO
(14 KMS)
PAPALHUAPA VICINITY
FROM 1:50,000 SHEET
"ASUNCION MITA" 1968
THREE KMS
N
TO ASUNCION
MITA (10 KM)

Map 1



Map 2. Geologic reconnaissance map of part of southeastern Guatemala (From Williams, McBirney and Dengo 1964, fig. 2)

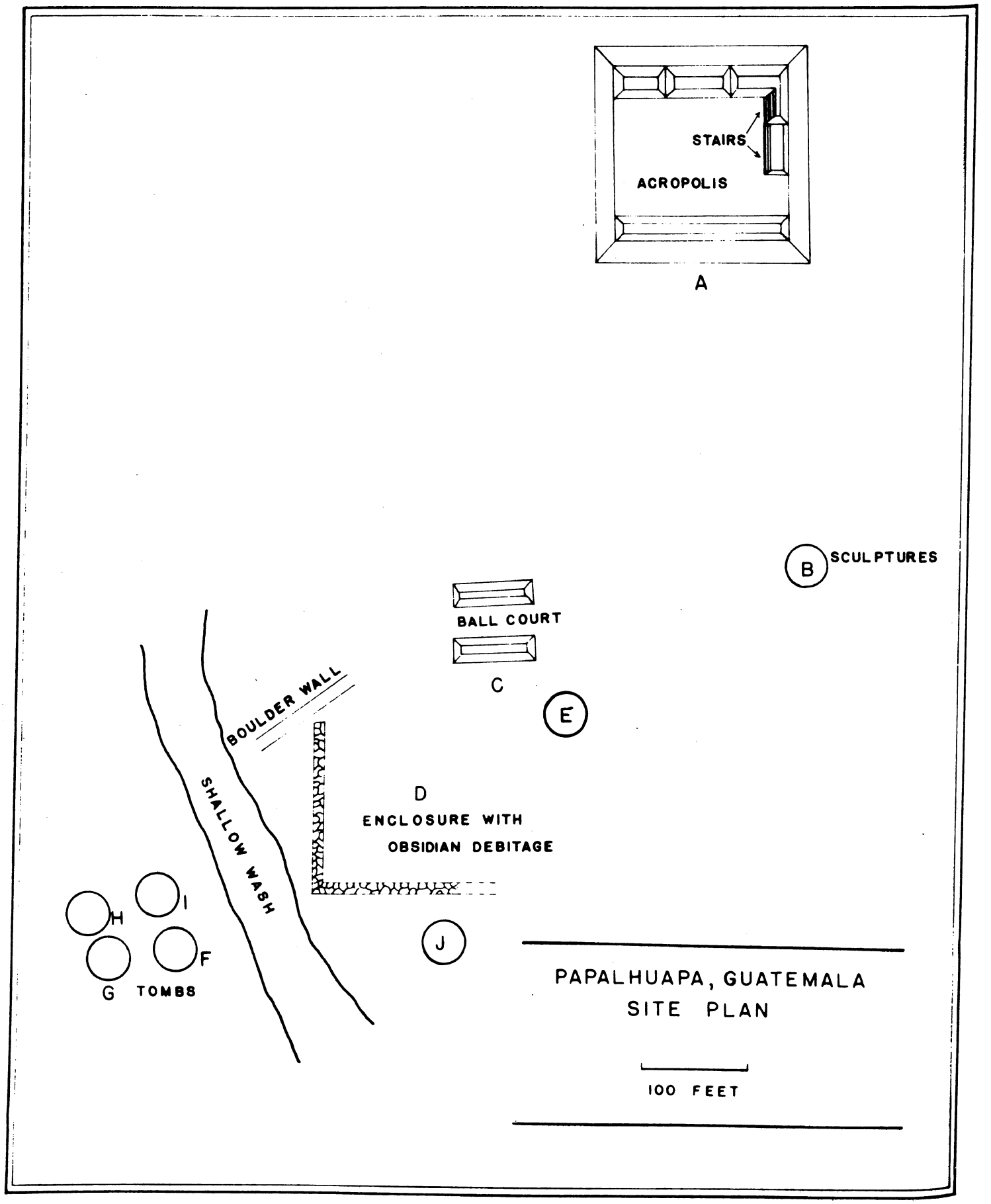

STAIRS
ACROPOLIS
A
B
SCULPTURES
BALL COURT
C
E
BOULDER WALL
SHALLOW WASH
D
ENCLOSURE WITH
OBSIDIAN DEBITAGE
H
I
F
G
TOMBS
J
PAPALHUAPA, GUATEMALA
SITE PLAN
100 FEET

Figure 1

Laguna de Obrajuelo (looking south), with village of Papalhuapa near upper center. Photo S. Bonis.

Profile views and upper surface of the broken tenoned parrot head ball court marker from Papalhuapa. Length 20 cm.

Plate 1

Plate 2. Seated jaguar sculpture, Papalhuapa. Height 97 cm.

Plate 3. Obsidian bifacial knives and flake blades, Papalhuapa.

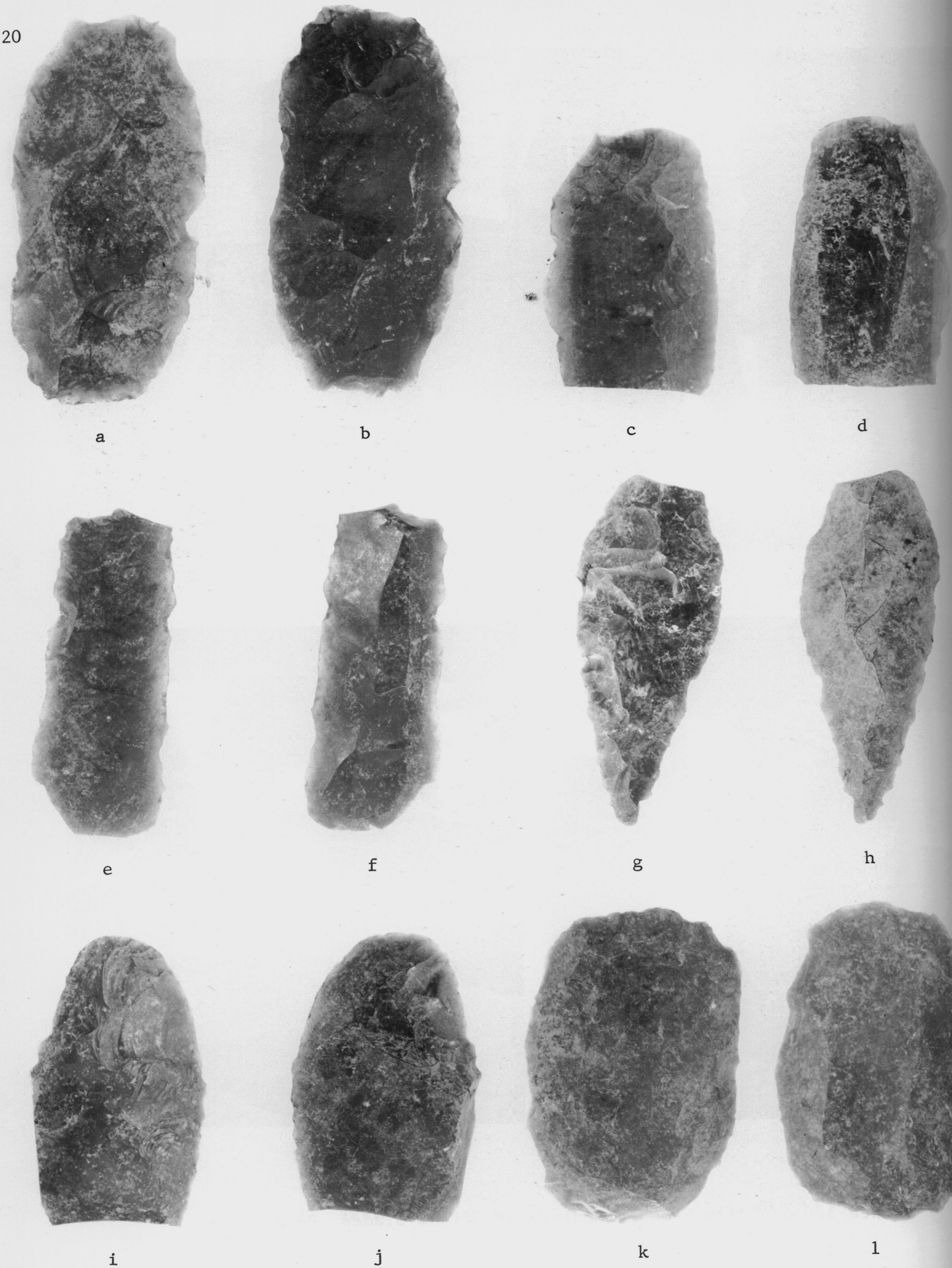


Plate 4. Obsidian bifacial knives and trading preforms, Papalhuapa.

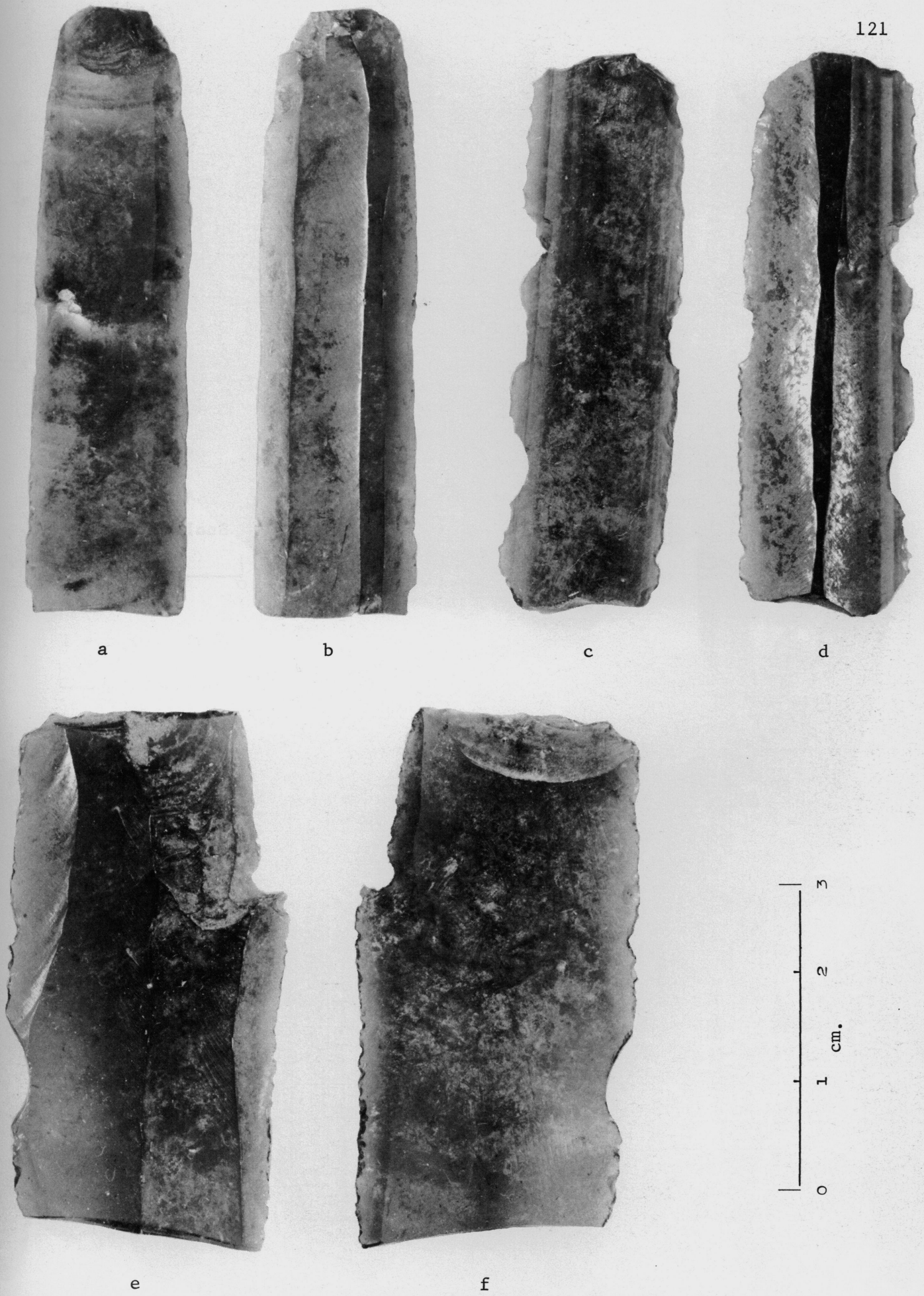


Plate 5. Obsidian prismatic blades, Papalhuapa.

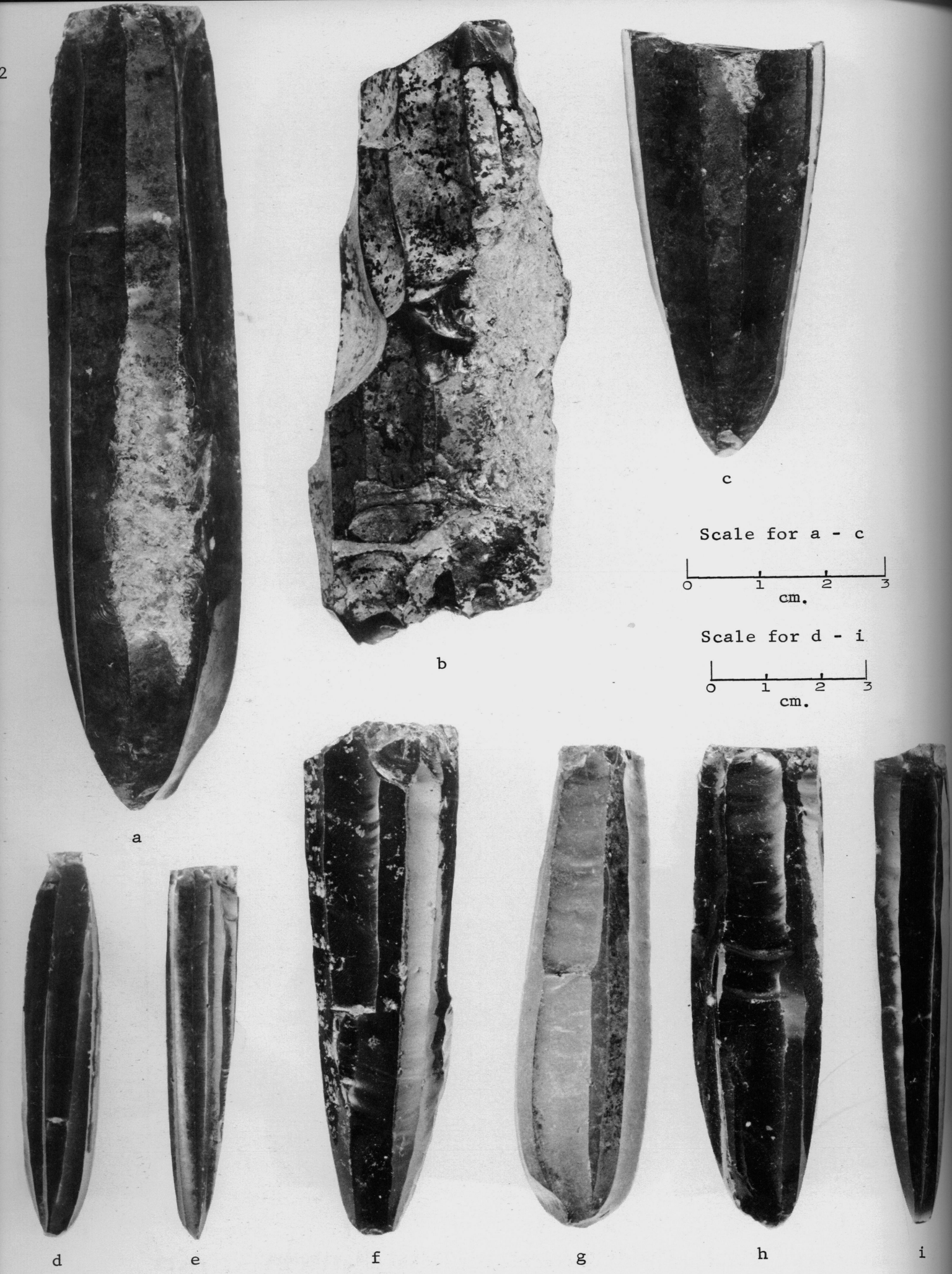
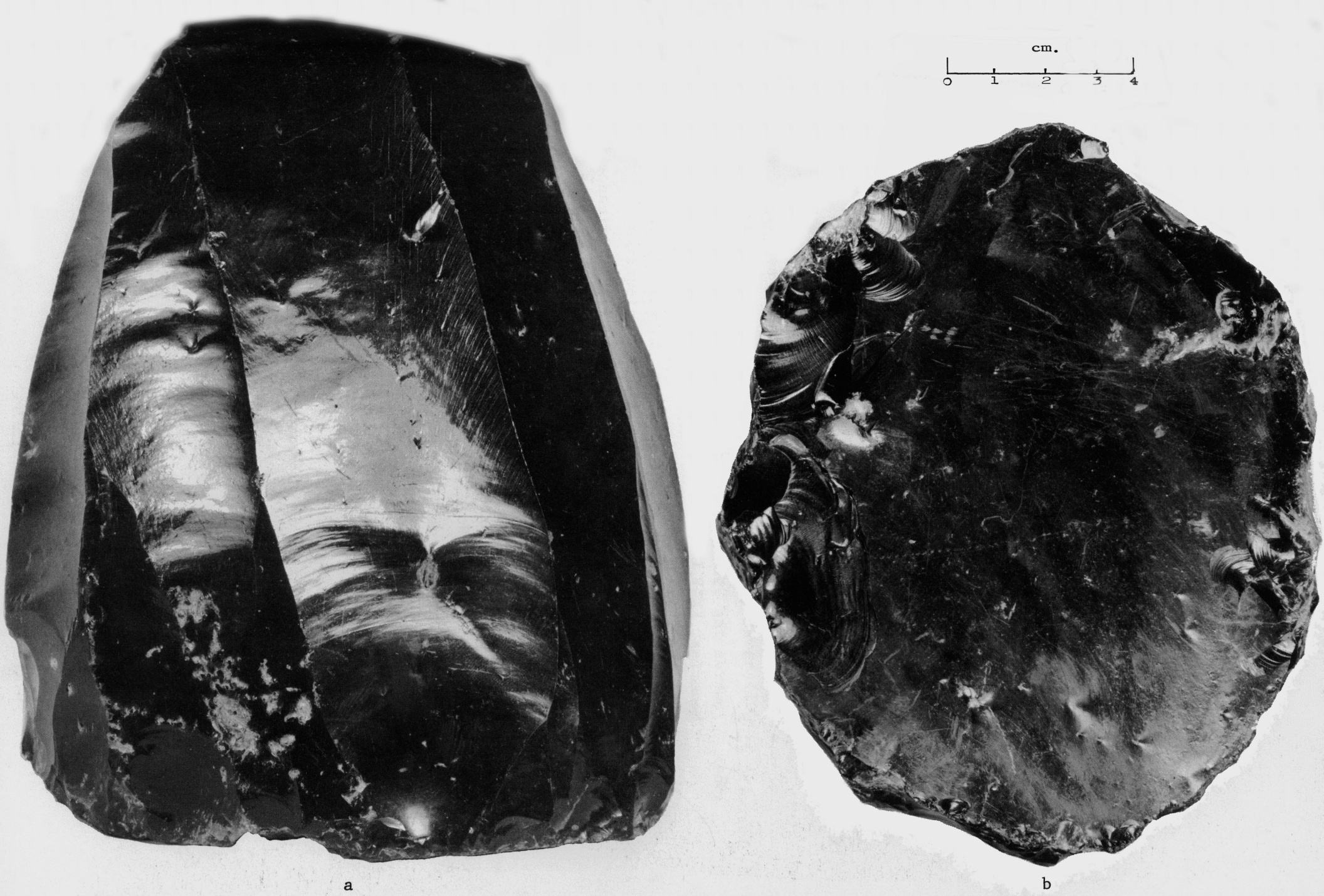


Plate 6. Obsidian polyfacetted cores, Papalhuapa.



a b

Plate 7. Profile and flat platform base of large obsidian blade core, Papalhuapa

Bibliography

Azurdia, C. E.
1927 Las Ruinas de Papalhuapa. Anales de la Sociedad de Geografía e Historia, 4:65-70, Guatemala, C.A.

Barnes, A. S.
1947 The Production of Long Blades in Neolithic Times. American Anthropologist, 49:625-630.

Borhegyi, S. F.
1965 Some Unusual Mesoamerican Portable Stone Sculptures in the Museum für Völkerkunde, Berlin. Baessler Archiv, n.f. 13:171-206.

Courtis, M. de
1865 Note relative à la fabrication des couteaux astèque en obsidienne. Arch. Commission Scientifique du Mexique, 1:452-453.

Epstein, J. F.
1964 Towards the Systematic Description of Chipped Stone. Actas y Memorias, XXXV Congreso Internacional de Americanistas, Mexico, 1962, Vol. I:155-169.

Heizer, R. F., H. Williams and J. A. Graham
1965 Notes on Mesoamerican Obsidians and Their Significance in Archaeological Studies. Contributions of the University of California Archaeological Research Facility, No. 1:94-103, Berkeley.

Kidder, A. V.
1947 The Artifacts of Uaxactun, Guatemala. Carnegie Institute of Washington, Publ. No. 576.

Kidder, A. V. and A. Smith
1943 Explorations in the Motagua Valley. Carnegie Institute of Washington, Publ. 456, Contribution 15.

Kidder, A. V., J. D. Jennings and E. M. Shook
1946 Excavations at Kaminaljuyu, Guatemala. Carnegie Institute of Washington, Publ. 561.

MacCurdy, G. G.
1900 Obsidian Razor of the Aztecs. American Anthropologist, 2: 417-421.

Mena, R.
1913 El Trabajo de la Obsidiana en México. Sociedad Mexicana de Geografía y Estadistica, Boletín, Epoca 5, Vol. 6:203-211.

Miles, S.
1965 Summary of Preconquest Ethnology of the Guatemala-Chiapas Highland and Pacific Slopes. Handbook of Middle American Indians, 2:276-287.

Semenov, S. A.
1964 Prehistoric Technology. London: Cory, Adams and Mackay.

Shook, E. M.
1952 Lugares Arqueologicos del Altiplano Meridional Central de Guatemala. Antropología e Historia de Guatemala, Vol. 4, No. 2:3-40.

Smith, A. L.
1961 Types of Ball Courts in the Highlands of Guatemala. In Essays in Pre-Columbian Art and Archaeology (100-125). Harvard University Press.

Stromsvik, G.
1950 Las Ruinas de Asunción Mita: Informe de su Reconocimiento. Antropología e Historia de Guatemala, Vol. 2, No. 1:23-28.

1952 The Ball Courts at Copán. Carnegie Institute of Washington, Contributions, 55:185-214.

Villacorta Calderón, J. A. and Carlos A. Villacorta
1930 Arqueologiáa Guatemalteca. Guatemala.

Weaver, J. R. and F. Stross
1965 Analysis by X-Ray Fluorescence of Some American Obsidians. Contributions of the University of California Archaeological Research Facility, No. 1:89-93, Berkeley.

Williams, H., A. R. McBirney and G. Dengo
1964 Geological Reconnaissance of Southeast Guatemala. University of California Publs. in Geological Sciences, Vol. 50.

VII. THE 1968 INVESTIGATIONS AT LA VENTA

Robert F. Heizer, John A. Graham and Lewis K. Napton

Acknowledgments

The individuals listed above and the authors of Appendixes I and II, Patrick S. Hallinan, Richard D. Ambro, James F. O'Connell, C. William Clewlow, Jr., and Christopher R. Corson, were all participants in the 1968 University of California investigations at La Venta. We wish to acknowledge our indebtedness to the following persons who aided us:

Dr. Philip Drucker, Department of Anthropology, University of Kentucky, for his assistance in making local arrangements at La Venta and for advice on procedure when we had reason to think that our advent might not be greeted with unmitigated delight;

Ing. Roberto Gutierrez Gil, for arranging with one of his colleagues in Petroleos Mexicanos for the use of a helicopter to photograph the La Venta pyramid and the Stirling Group;

Dr. Howel Williams, Department of Geology, University of California, Berkeley, who was a member of our party for part of the time and who identified rocks;

Dr. C. Rainer Berger, Institute of Geophysics and Planetary Physics, University of California, Los Angeles, who visited La Venta while the excavations were in progress and has made radiocarbon age determinations of charcoal samples from the site;

Dr. Fred H. Stross, Shell Development Company, Emeryville, California, who visited the site for a week and has done analyses of obsidian and other materials at our request;

Arql. Carlos Sebastian Hernandez, Conservador, Museo del Estado Villahermosa, Tabasco, Mexico, who provided us with the most valuable assistance in interceding in our behalf with governmental authorities in Tabasco during our work at La Venta;

Arql. Eduardo Contreras, Jr., Mexico, D.F., who, as representative of the Instituto Nacional de Antropología e Historia in our work at La Venta, was a constant source of useful information, advice, and valuable assistance in many respects;

Dr. Carlos Pellicer, founder of the Museo del Estado in Villahermosa and a strong supporter of Tabascan archaeology, who also interceded with authorities at La Venta in our behalf when aid was needed most.

In Mexico we were provided with aid and assistance by the late Dr. Eusebio Dávalos Hurtado, Director of the Instituto Nacional de Antropología e Historia; his successor, Dr. Ignacio Bernal; and Dr. Ignacio Marquina, El Jefe del Departamento de Monumentos Prehispánicos, who approved our application for an archaeological permit. The present report will be submitted to Dr. Marquina in satisfaction of one of the provisions of Concesión Arqueología No. 10/67.

We reserve for last our special thanks to Dr. Melvin Payne, President of the National Geographic Society, who since 1955 has remained interested and encouraging in the continuation of investigation of the La Venta site; and to Dr. Leonard Carmichael, Vice President and Chairman of the Committee on Research and Exploration of the National Geographic Society, who has received our applications for support and presented them to the Committee who has provided the funds for the 1968 La Venta expedition.

INTRODUCTION

The history of the discovery and early notices of the site of La Venta in the state of Tabasco, southeastern Mexico, has been set down in several places (Drucker 1952; Drucker, Heizer and Squier 1959; Coe 1965) and need not be repeated here. W. R. Wedel (1952:34-79) carried out important stratigraphic excavations in the Ceremonial Court area (otherwise called Complex A) in 1943, but it was not until 1955 that what can be called large scale investigations took place. This work, which lasted from mid-January to late May of 1955, was supervised by Philip Drucker and Robert F. Heizer, and the results were published in Drucker, Heizer and Squier, 1959 (hereafter referred to as DHS). Notwithstanding the considerable amount of time spent, and the generous support of the National Geographic Society in financing the work, the 1955 expedition did not succeed in making a map of the site area which lay to the south of the great pyramid, nor was serious search made to define the full limits of the site as evidenced by mound constructions. The "island" of La Venta was, in 1955, still covered with a dense growth of tropical forest, and the time and funds which would have been required to clear this vegetation were simply not available. It is not surprising, therefore, that as subsequent visits to the archaeological zone have been made, and as the heavy forest growth has been cut back, mounds whose existence was unknown to us have come into view, and mounds which were covered with monte have a rather different form than was assumed when their surfaces could not be clearly seen.

Since 1955 many changes have been made in the archaeological zone of La Venta. These are summarized in Paper I in this volume which deals with investigations in 1967, and in a conference paper given in October, 1967, at the Dumbarton Oaks Symposium on Olmec Culture (Heizer 1968). As of 1967, twelve years after the extensive explorations by Drucker and Heizer in Complex A, no archaeological work of a serious nature had been continued there.[1]

Drucker, Heizer and Squier were the target of a spirited and lengthy critical review of their 1959 archaeological report by W. R. Coe and R. Stuckenrath (1964). This review was answered by Drucker and Heizer (1965) with the conclusion that the 1959 publication was, in the main, correct. However, because of the Coe-Stuckenrath critique, we reviewed once more our excavation data and the conclusions derived from these. We realized that the radiocarbon dates which had been secured in 1957 from charcoal collected in 1955 (DHS 1959:264-267) might not be as accurate as they could be if they were analyzed with the more precise methods now available. A hint of this was in the C-14 age determination in 1965 of halves of two samples which had been radiocarbon dated in 1957 (Drucker and Heizer 1965:52). Dr. James B. Griffin of the University of Michigan kindly returned the unused portions of the charcoal samples collected in 1955 and these were radiocarbon dated in 1967 at the UCLA laboratory. The revised dating of the La Venta site by Berger, Graham and Heizer (1967) suggests that the age of La Venta lies in the time span between 1000 B.C. and 600 B.C.

Once the revised dating was accomplished, it seemed desirable to collect additional charcoal samples from the La Venta locality to verify this. Accordingly, Drucker and Heizer, with support provided by the National Geographic Society, visited La Venta in July, 1967, and in a brief but intensive campaign managed to collect a large number of samples of charcoal. While there, Drucker and Heizer observed the great pyramid which, for the first time, had come into relatively full view because of the recent removal of part of the forest cover from its slopes (pl. 2a).

The preliminary and essentially accurate observations of the pyramid made by Drucker and Heizer were presented at the 1967 Dumbarton Oaks Symposium (Heizer 1968), reported to the Instituto Nacional de Antropología e Historia in an account of the July 1967 work (Paper I in this volume), and in a separate note printed in Antiquity (Heizer and Drucker 1968). We made these preliminary reports for two reasons: (1) we preferred to correct our own past errors of observation, and (2) we had no plans or funds to return

---

[1] R. Piña Chan and R. Gallegos made investigations in 1958 which have been reported on only in the most general way in Piña Chan and Covarrubias (1965:16-23). R. Squier's ceramic test pit data of 1963 have not been published.

to La Venta in the immediate future to study and map the pyramid in a careful way, and therefore thought that our brief observations on its unusual form should be communicated to our colleagues.

Had we known in July, 1967, that six months later we would once more be at La Venta with a large and competent group of graduate students, we would have waited to announce the "discovery" of the cone which we call a pyramid. Once more the National Geographic Society provided a generous grant to carry out a project during the months of January and February, 1968 – that of making a detailed topographic map of the pyramid, completing the map of mound structures and monument locations in the site called Complex B which lies to the south of the pyramid, and the excavation of ceramic test pits.

All of these aims were realized, although not in each case as completely as we had hoped. The chief reason for the incompleteness of some parts of the investigations is the result of an attitude which can only be described as unfriendly, uncooperative, and often hostile, directed toward us and our work by the Delgado Municipal of the village of La Venta. The Delgado and his "staff" set the tone of relationship at the outset when he stated that he could not permit our group to make investigations because he did not have the authority to do so, particularly since in his opinion all of the signatures which were affixed to our contract (between the Instituto Nacional de Antropología e Historia and the Regents of the University of California) were falsifications. We were warned, under threat of arrest and detention, not to proceed. That the Delgado's warning was not merely a bluff seemed supported by the recollection that in July, 1967, Drucker, Heizer, Mrs. Heizer, and Arql. Carlos Sebastian Hernandez, Conservador of the Museo del Estado in Villahermosa, had all been arrested at La Venta and held briefly until our authorization (INAH Concesión No. 5/67) was checked. The full story of six weeks of almost constant harassment by the local authorities – the interference of a "Vigilante" appointed by the Delgado to observe all our actions, the stirring up of local feelings against our group by spreading tales that we were excavating and stealing great treasure, the general belief that we were finding and removing gold from the site, attempts at a shakedown by the local sindicato, nightly tearing down of the walls of our ceramic test pits, confiscation of eleven of the Olmec sculptures which we discovered, removal of survey stakes each night, and continual confrontations and threats of arrest and bodily harm – all go to make the recollection of the attempt to carry out our mapping and exploration project something like a bad dream. Two members of our party, Arql. Carlos Sebastian Hernandez and Arql. Eduardo Contreras, Jr., who have been mentioned above, performed most valuable service us by communicating with federal officials in Mexico City and the Governor of the State of Tabasco, and these officials were able to reduce, but not stop, the harassment and threats by the local people. A series of distinctly

unfriendly articles about our work in local newspapers also proved to be a hindrance.

All of the above is a summary of our difficulties, and it is provided here as a partial explanation of why none of our ceramic test pits were completed and why the general site map is not more complete. There were many days when we felt that it would be dangerous for the group to divide up and spread out in two's and three's to do instrument mapping here, test pit digging there, or cutting acagual in another place to bring a mound into view so that it could be measured and mapped. All of this caused delays, and these are reflected in the shortcomings of our information.

THE LA VENTA PYRAMID

Mapping

Topographic survey of the La Venta pyramid was accomplished in three phases. First, the great mound of clay had to be cleared of vegetation (compare pl. 2a and 2b); this was done with a crew of sixteen local workers who performed this considerable task in a space of fifteen days, using machetes. Second, the contour map of the pyramid was made. Third, the platform upon which the pyramid had been erected was mapped.

The scale of the contour map of the pyramid (at end of volume) was one inch to 20 feet. This interval was chosen in order to best delineate the spatial arrangement of features which it displayed. The working contour interval of 8 feet was selected as one which would provide reasonable control and accuracy, and also permit rapid and comprehensive coverage of the entire pyramid and of the basal platform. Mapping was carried out by standard plane table techniques (Breed and Hosmer 1938).

The field maps were made on sheets of .005 polyester acetate engineering film. The high tolerance humidity coefficient and water repellent characteristics of this plastic material were very useful; more than once the surface of the plane table was literally awash in the afternoon downpours. The weather fluctuated between periods of heavy rain and high winds coming in off the Gulf to the north, and very hot, sunny days when the humidity was high. The dimensional stability of the plastic drafting sheet was essential because of the highly variable daily temperature extremes.

We used a Johnson plane table with Gurley telescopic alidade and Beaman stadia arc. The plane table was initially set up over the 1955 central datum point in Complex A, and a traverse run from that point to the summit of the pyramid. Lateral shots were taken to provide triangulation points at the base of the structure. Civil engineers of Petroleos Mexicanos had estab-

lished a triangulation point (a brass plate set in a square concrete base) on the summit of the pyramid and we used this convenient point as a central datum for our map, assigning to it an arbitrary elevation of 0'0". Azimuths were projected down the principal ridges which radiated from the vertex of the pyramid, and contours were plotted by side-shots taken in reference to each azimuth. Azimuths were verified by resecting previously plotted points, and by standard foresight and backsight procedure (Davis and Foote 1953: 410-432). Key distances were measured by a steel tape, and stadia distances were taken with periodic closures as an accuracy check. Failure of closure at contour 48.00 was 6.4 feet, horizontal distance. All contours with the exception of 8.00 were surveyed by sectoral procedure rather than by sequential side shots. Under these circumstances, some cumulative error was inevitable since, as Davis and Foote (1953:445) note: "Owing to errors in field measurements of both angles and distances, in general an unadjusted traverse will not close on paper even though the plotting be without error."

Since the slope of the structure averages 30 degrees (pl. 4c) and exceeds 75 degrees in some spots where there has been erosion, one can appreciate the difficulties involved in leveling the plane table and tripod legs, and in maintaining the stadia rod at the vertical. Strong winds, frequently preceding a norte, buffeted the surveying equipment as well as the surveyors. Inclement weather and difficult terrain are, of course, encountered in almost any kind of field surveying, but our mapping was unduly complicated by the additional uncopperative attitude of some of the local people. Strips of bright orange cloth used to mark our baseline reference stakes disappeared nightly and appeared the next day as hatbands worn by sightseers. Reference stakes were uprooted with monotonous regularity, and contour stakes were daily pulled out and pitched into the deep grass at the base of the pyramid. In retrospect, it seems that we cut and drove as many stakes as were used to survey the Central Pacific Railroad.

Despite delays, however, we were able to complete the detailed contour map of the La Venta pyramid. Our map, which is published here (at end of volume), is, we believe, an accurate one. If any reader desires to look at the pyramid, we suggest that he do this sooner rather than later. The Delgado Municipal told us several times that it was his intention to have a roadway cut with a bulldozer which would spiral up to the top of the pyramid so that tourists could reach the apex of the cerro without the effort of climbing there on foot. Having considerable respect for the abilities of the Delgado to do the unexpected and unusual, we would not be at all surprised to learn that he has done precisely this. Such modification would, of course, be an act of destruction, and would be all the more unfortunate since this particular pyramid seems to be the oldest in the New World. There is every reason to hope that it may be spared such a fate in order that it can be adequately explored.

Form

The present map of the La Venta pyramid supersedes the preliminary base plan published by Heizer and Drucker (1968). It is evident that the pyramid has a circular base plan. Some erosion, especially on the north and west sides, as well as earth removal with a bulldozer in 1958 along the east and south basal margins, obscure to some extent the original base form. The dimensions of the pyramid given in DHS (1959:11) as 420 feet long (N-S) and 240 feet wide (E-W) are, as pointed out, quite incorrect, as is the rectangular base plan and four flat sloping sides shown in DHS (1959). Heizer and Drucker (1968:54) suggest that the original basal diameter was 390 feet. Using the present more accurate map, we prepared a series of circles representing scaled diameters ranging from 400 to 460 feet. A transparent copy of the contour map was superimposed over these circles, and it was apparent that 420 feet is the most probable original minimum diameter. This figure we now propose as a final one.

The calculation of the height of the La Venta pyramid is something of a problem. The mean height for the original structure was stated by DHS (1959: 372) to be 100 feet, and after further consideration we believe that this figure is still acceptable. The surface level of the surrounding terrain differs at different points on the perimeter of the pyramid. The so-called "platform" extending along the southern and eastern margins of the base of the pyramid represents, in our opinion, an artificial fill which was laid down to provide a leveled base for the pyramid construction. Why it was built to the heights it was we cannot say for certain, but it is likely that this elevation was selected by the original builders in terms of a fit with the level of mounds and the low-walled Court or plaza referred to as Complex A, which lies to the north of the pyramid. A further problem concerning the estimate of the original height of the pyramid comes from the report that some time after 1955 Petroleos Mexicanos enlarged the surface area of the truncated top of the structure by removing one to two meters of soil and dumping this over the side. That this was done is quite apparent, but how much earth was moved cannot now be determined. Everything considered, we believe that a suggested original elevation for the pyramid of 100 feet above the leveling platform is reasonably accurate.

As the pyramid slowly emerged into plain sight as the chopeadores cut down trees and scrub, it became clear that Drucker and Heizer had been correct in their observations made six months earlier, that the sloping sides of the pyramid bore a series of alternating ridges and valleys—in all, ten of each category. These vary in width and depth (see map of the pyramid at end of volume and pls. 1 - 4) and are not equally spaced. In part, the differences in the width and depth of some of the valleys or depressions, and correspondingly of the intervening ridges, is due to erosion.

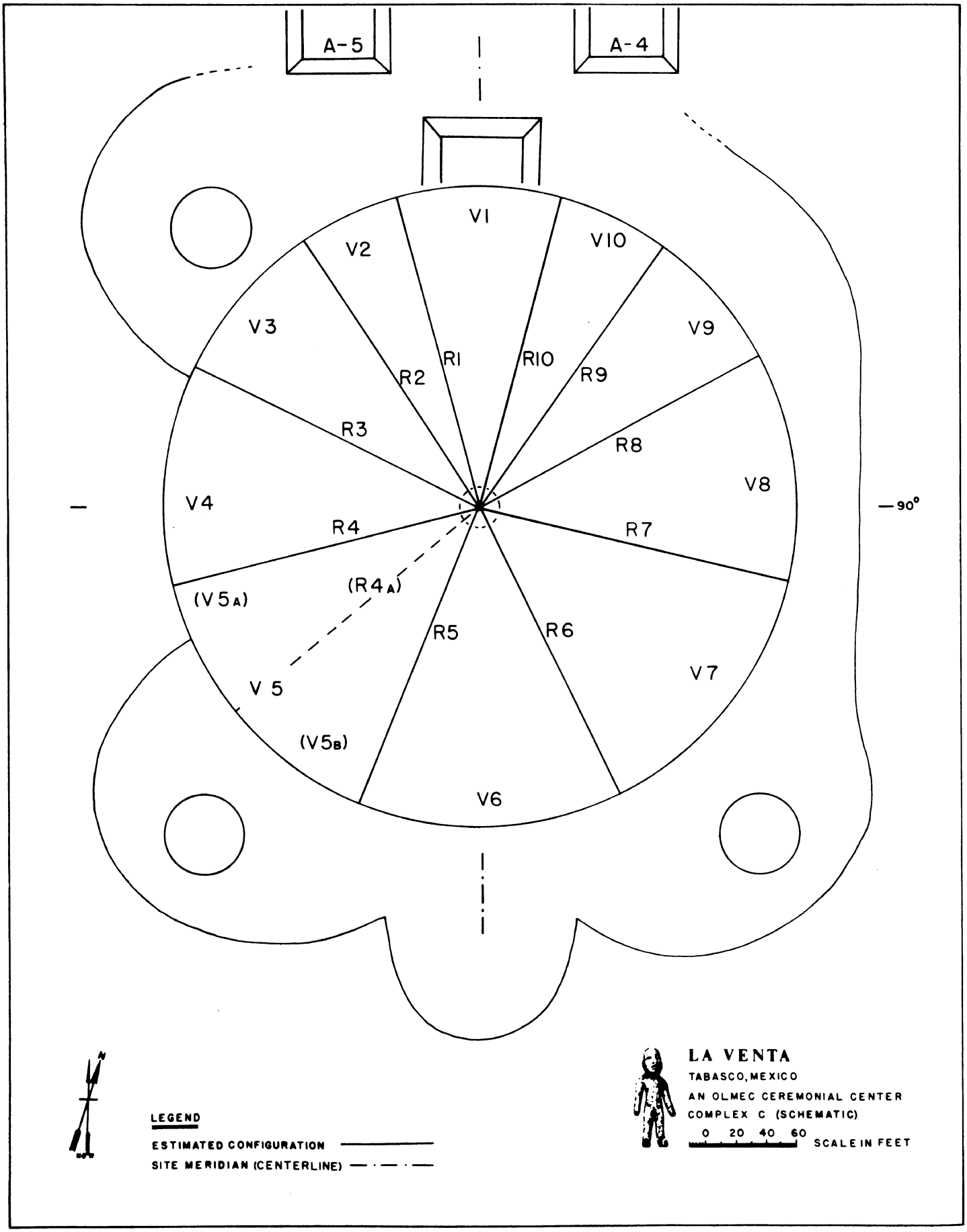


Fig. 1. Schematic plan of La Venta pyramid

The ridges and valleys on the east side of the cone are the most regular and best preserved (pl. 1); the main or central valley which faces north (pls. 2c,3a) and the valleys which face west (pl. 2d) show the greatest amount of erosion. This differential erosion can be accounted for, we believe, by assuming that on the north along the centerline a trail has been kept open since ancient times for people to climb to the top of the mound and enjoy the view. If this is so, the occasional hacking off of a shrub or sapling to keep the trail conveniently open would have had a cumulative effect of exposing this line to erosion by rain, with the result that gullying and washing continuing over a long period of time have reduced the surface level and widened the valley. It is logical to assume that the original trail, perhaps in the form of a stair or ramp, may have run up the center of the structure on the north face, for this is the line which faces Complex A, but we did not note any constructional evidence for this on the surface. Excavation in future may bring some evidence for a formal approach to light. The series of four pits dug into the west face of the ridge (R 10 in fig. 1) sloping down into the centerline valley (V 1 in fig. 1) were exploratory pits dug by Drucker in 1940 when he was examining the densely forested La Venta area for likely spots to collect sherds. But beyond these recent pits, one gets the impression that a considerable amount of ancient pit digging has gone on in the V 1 depression. It occurs to us that this was done by post-La Venta occupants of the area who were scratching around looking for some kind of "treasure" (stories of treasure in the cerro are common at La Venta; cf. Foster 1964) which they hoped might be found there, or who may have stumbled on the fact that "treasure" of the Olmec variety (especially jade objects) did indeed occur, buried in the form of ritual offerings in V 1, and exploited this discovery. Once more we can only say that careful archaeological exploration of V 1 may provide hints on the cause(s) of its erosion. Heizer and Drucker (1968:54) suggest that after the abandonment of the La Venta site by its designers and builders, a local population of farmers may have lived on and around the site and built houses on the west side of the pyramid where there is protection from the full force of the nortes which are common from November to February. If so, the west exposure of the pyramid may have been cleared for growing crops, and thus been exposed to greater erosion than the other sides.

Beyond these departures from a regular or mechanical distribution of ridges and valleys, we noted that between R 4 and R 5, in what we take to be V 5, there is an extra low and incomplete ridge (labeled R 4a, which separates V 5a and V 5b). This is clearly an anomaly, and R 4a appears to us to be a fill which has been dumped into what was originally a single valley (V 5) and a duplicate of several others (V 4, V 6, V 7, V 8) as regards width and depth. We invoke again (but without any supporting evidence to bolster the suggestion) the assumption that in ancient times, presumably after the abandonment of the site by its original builders, a

group of treasure seekers dug a large hole in the top of the pyramid and dumped the spoil into V 5. This loose fill then formed a ridge through vertical cutting by water erosion at the two most vulnerable points; namely, along the juncture of the loose fill laid up against the sloping and consolidated clays of ridges R 4 and R 5. This hypothesis could be tested by exposing a continuous section in a trench extending from the crest of R 4 to the crest of R 5. We had the intention of doing this, but our relations with the Delgado Municipal, who felt very protective about the pyramid on which he hopes to build a summit access road, persuaded us that this would be inadvisable.

Figure 1 represents our effort to derive a geometric plan of the perimeter circle of the pyramid, and to delineate the ridge system by lines drawn along the crests. In this figure the lines labeled R, of which there are ten, are ridges; the intervening V designations, of which there are also ten, are the valleys. Some judgment and extrapolation are required to derive such a figure, and we do not press our attempt as a final, or necessarily accurate, one. However, regardless of who might draw such a figure, it would look rather like the one we have made, though the internal angles of the radial (ridge) lines might differ slightly. What seems obvious is that the La Venta pyramid was planned according to a definite geometric design. We note, for example, that the centerline of the site (orientation 8 degrees west of true north) runs through the midpoint of two valleys (V 6 on the south, V 1 on the north), and that a line drawn to the perpendicular of the centerline from the center of the basal circle also runs through the approximate midpoint of two valleys (V 8 on the east and V 4 on the west).

Our measurements of the inner angles formed at the junctions of the ridge radii (R 1/R 2, R 2/R 3, etc.) are as follows:

Ridge angles	Degree of arc
R 1/R 2	18
R 2/R 3	30
R 3/R 4	40
R 4/R 5	53
R 5/R 6	50
R 6/R 7	51
R 7/R 8	41
R 8/R 9	26
R 9/R 10	20
R 10/R 1	31

There may be some pattern or system here beyond the immediately visible one where the ridge angles of the northern half of the pyramid are smaller

than those of the southern half. Incidentally, ignoring R 4a as an original ridge and assuming that V 5 filled the area between R 4 and R 5, makes for a much more regular pattern. We should add that the R 4a anomaly was observed in the field, there discussed at length, and the decision made to consider it as a probable later imposition on the original structure. That this is so we believe to be highly probable, even though our gratuitous explanation as to cause might be incorrect.

Suggestions have been made earlier (e.g. Heizer 1960, 1961) that the La Venta Olmecs were astronomers. This could not then, and cannot now, be proved with information presently available, but the proposition is not thereby ruled out. Much has been written about the part the Olmecs may have played in the development of the calendar to which the name of the Maya is usually attached. This also seems, at the moment, beyond proof since such glyph-bearing pieces as the Tuxtla Statuette and Stela C from Tres Zapotes are not fixed at all, or only tentatively, in the Olmec cultural-chronological sequence, even as imperfectly as this is now understood (cf. DHS 1959: 263-264). What we can suggest, however, is that the La Venta Olmecs were practicing metrologists and geometers, the evidence for this being the adherence of the centerline of the site as a lineal reference and the considerable indications that some efforts were made to space site features in a balanced and equidistant relationship to the centerline. Until now we have thought of La Venta as having been laid out by designers who were "right-angle oriented" in their planning programs, but the pyramid layout shows that they were also "circle conscious." It is tempting to think hopefully of the La Venta pyramid as having some astronomical observatory-horizon sighting-calendrical function, partly because we have all been made aware of such circles with these functions that are rather older in Europe; e.g. Stonehenge (Callanish and Hawkins 1965a, 1965b), and a number of other British megalithic sites which have been studied by A. Thom (1966, 1967). The present authors are not competent to speculate on what the purpose and aim of the original La Ventans may have been in devising lines of orientation, on the possible La Venta measurement unit, whether the La Venta pyramid was a sighting station, and why the site combines both circular and rectangular constructions.

We calculate the approximate area of the base of the pyramid as 138,544 square feet (12,871 square meters). If the cone were a smooth surfaced conoidal frustum, its volume would be 4,212,034 cubic feet. The cubic content of the ten valleys would have to be calculated and subtracted from this figure to secure a relatively accurate figure of the actual cubic mass. We have not done this, but believe that the figure earlier proposed by Heizer and Drucker (1968), of 3,500,000 cubic feet (106,680 cubic meters), is an acceptable, though admittedly approximate, figure.

The Platform Base

Our 1968 map of the pyramid (at end of volume) includes the platform or base upon which the pyramid was presumably erected, and which is most prominent on the south, and to a lesser extent on the east, side of the pyramid. This platform was covered with heavy growth both in 1955 and in July, 1967. The map in DHS (1959, frontispiece, figs. 4,5) is quite incorrect, as Heizer and Drucker (1968) have admitted. The present (as of February, 1968) shape and the contours of this platform are shown in our 1968 map. It was quite clear to us on the ground in early 1968 that the present form of the platform south of the pyramid (pl. 3b) was in part a recent artifact. We were told that in 1958 a Pemex bulldozer was used to level off backdirt piles and to cut a low face against the toe of the pyramid. The signs of this earth-moving are quite apparent today. The earth was then moved to the edge of the declivity of the original, and perhaps somewhat eroded, platform in such a way that the bulldozer operator was the author of the straight-edged, steep-banked, right-angled corners which are now apparent. In 1967 we sensed that something of the sort had happened, but the vegetation cover which we did not clear prevented our having a clear view of the construction. We did clear the platform in 1968, and found that our proposed form of the platform published earlier (Heizer and Drucker 1968, fig. 1) is reasonably accurate.

Originally the platform seems to have taken the form of three arcs, the central one of which (now much emphasized due to refashioning by the bulldozer) held two altars (Altars 2 and 3). Each of the arcs which flank the central one bears a small, low mound. Whether these contain or cover something, or served as bases for monuments erected on their top surfaces, we do not know. No platform-leveling base can now be detected along part of the west side of the pyramid base. Whether this once existed and has since been removed, or whether it was never built, we cannot say. The northwest "corner" of the pyramid bears an elevation with a small mound on top, forming a feature reminiscent of the two balanced arc-platform lobes with similar mounds at the southwest and southeast "corners." There is no corresponding leveling platform arc or lobe at the northeast "corner." There has been so much disturbance, resulting from digging and bulldozing carried out after 1955, in the area north of the pyramid (i.e. Complex A) that Mounds A-4 and A-5 are no longer visible. How the leveling base-platform joined, or did not join, with these mounds we cannot now, and probably can never, tell.

With this we leave our observations on the La Venta pyramid. We do not consider that our investigation has done much beyond learning what its size and form are at the moment. But even this contemporary record is sufficient to allow us to say that it is probably the most unusual Olmec architectural construction thus far discovered. This great construction will no doubt be investigated in future, and if it should remain without further material damage, we can hope to learn something of its constructional plan and contents.

SITE PLAN OF LA VENTA

An effort was made to complete the plan of the La Venta site during our 1968 program of work. The pyramid, of course, was part of this, and the site extension (Complex B) to the south of the pyramid was the other part. Complex A to the north of the pyramid has been, we believe, adequately mapped (DHS 1959). This section of the site has been so torn up by bulldozers that no surface feature whatsoever exists that can be identified as being present in 1955. The 1955 map of Complex A, therefore, is the best we will ever have.

There are numerous houses in the west and south sections of the site which have encroached upon the archaeological zone, and there has been a good deal of earth-moving with bulldozers and road-graders which have been busy leveling low mounds and using the earth to fill in depressed areas. A number of sculptures have been turned up in this process and the official INAH guardian, Sr. Fermin Torres, has made every effort to secure such finds and deliver them to the Museo del Estado in Villahermosa where they can be preserved. The Guardian was also our labor crew foreman, and was therefore in an excellent position to point out the locations at which these salvaged monuments had been discovered. With his help we were able to relocate all of the known monuments still in place and to spot the find locations of removed pieces. This information is contained in our plan of the La Venta site (at end of volume). We have used the widely employed conventional symbols for site features (cf. Carr and Hazard 1961; Andrews 1967) for indicating mounds, and the reader is warned that while the map may show right-angled corners and flat-topped mounds, these features may in fact be rather different. We do not know what their original contours may have been since only excavation could hope to provide this information. Identification of the different sculptures (monuments, altars, stelae, colossal heads, etc.) shown on the map can be found by referring to Appendix II of this paper.

Among our observations is the existence of what we have called the "Great Platform" which stands southwest of the pyramid. This is an acropolis-like structure, apparently built of clay and capped with occupation refuse. No sculptures were found in our ceramic test pits (Nos. 1967-5, 1968-1, 1968-3, 1968-7) which were dug here (see p. 154). We became aware of the rectangular form of this huge platform only after seeing it from the helicopter. It is covered with a dense growth of scrub and no clear view of it from ground level can be obtained, but from the air it stands out boldly as a single feature with a flat top and sloping sides. In our ceramic test pits we dug down to and barely penetrated the underlying tough construction clay levels. We did not proceed further than this because we were under constant harassment from rock- and bottle-throwing visitors during the day and by would-be looters who must have spent much of the night tearing down the walls in the

hope of finding some of the valuables which they seem to have assumed we were recovering. What these local excavators (who presumably secured their permits from the Delgado Municipal) found we do not know, but what little we learned is included in Appendix I below.

South of the Great Platform, and apparently in line with it, is another, narrower, longer, and lower mound. Its form as shown here is only a guess; it was not actually surveyed but is sketched in. That it is part of the general site complex is indicated by a large andesite boulder encountered earlier, and re-exhumed by us, in a well at its southern margin. A nearby and smaller mound (not shown) is said by local people to be a rich producer of clay figurines which children dig and sell to tourists. Monument 56 was found while digging a large open reservoir, and it seems probable that this section of the site, although covered with houses, still contains a number of buried sculptures.

South of the pyramid and sitting astride the centerline is the remnant of a large, low clay mound from which numbers of monuments have been recovered. More such, we believe, remain to be discovered here. Part of the western half of this low mound still remains, but it is also the site of several houses.

What is labeled the "Long Mound" (a term applied originally in 1940) also has some houses on its top and flanks. Not shown on our plan of the La Venta site is a cut about 25 feet wide which was made with a bulldozer and which runs directly in line with the two altars (A 2 and A 3). This cut was made in 1959?, according to a local report, to permit access to Altar 3 when it was removed to the Parque La Venta at Villahermosa. South of the Long Mound is what appears to be another similar mound, but its length was not determined nor are we certain that this is an artificial construction. It is said that Monuments 52, 53, and 54 lie at the southern end of this mound, but we did not visit the locality and cannot vouch for the accuracy of this claim.

Just west of the Long Mound is a prominent conical mound which we cleared. It shows an old, unfilled trench which runs north-south and which, by local report, was dug by Drucker in 1940. It is said that he found an offering(?) of about one gallon measure of obsidian flake blades ("razors") in the center of the trench.

Also found by us was the complex of structures which we have labeled the "Stirling Group" (see site plan) and which lies to the east of, and alongside, the Long Mound.

THE STIRLING GROUP

Mound Features

As we found an extra hour when things seemed quiet, we would go off with Fermin Torres as guide or by ourselves (usually at the risk of being snapped at by an unfriendly dog or two, or surprising a local person when we cut through his yard, or, as in one case, running into a well muscled, machete-wielding deaf mute weeding a milpa who warned us most graphically of the dangers of wandering about and getting bitten by a fer de lance, nauyaca) to try to spot mounds or locate known monuments to be later placed on the map. On such an exploratory walk we visited the detached basalt columns which had been pointed out to Stirling in 1940, who at the time dug a small pit to expose a series of six of these upright columns aligned in a north-south running row (pl. 4b). We were conscious of being on an elevation, but could not see its extent because it was thickly covered with acagual (second growth forest perhaps five years old). After the pyramid had been cleared of its growth, we moved the chopeadores to this elevated area and had them clear a section amounting to about 5000 square feet. An occasional fragment of basalt column (similar to those which bordered the Court or plaza of Complex A) occurred on the surface, but so far as we could see the columns or fragments were not distributed in any kind of a detectable planned array.

By chopping trails in the brush, we came to sense rather than see that we were on the top of a large, sloping-sided elevation. Standing on the southern edge of this high ground, and beyond the foot of the slope, was a broad, flat area, and at the southern edge of this flat area (near the west edge of which Altar 4 had been found by Stirling) stood two long, narrow mounds whose axes ran north-south. We could not decide whether we had a new and separate site or whether there might be a larger mound arrangement at La Venta of which the features just described were a part. When we were able to spend part of a day, toward the end of our campaign, inspecting and photographing the site from a helicopter made available by Petroleos Mexicanos, we saw immediately that the elevated area and the flat expanse to the south with the two long, narrow mounds were a unit. We have named this the "Stirling Group" in recognition of its original discoverer, and as a mark of the regard in which we hold Matthew Stirling. We have called the elevated area to the north the "Acropolis," the flat area the "Plaza," and the two mounds the "Ball Court." Whether the Plaza was in fact a plaza we do not know, and whether the two parallel mounds were a ball court in fact we do not know; only excavation will answer these questions.

The two parallel mounds are not identical. That on the west is 160 feet long; the other is 116 feet in length. Each is about 40 feet wide. We were so short of time that we could not trench the floor between the two mounds, and for this reason we cannot say more than that the mounds look like a ball court.

It was well known to us that the La Venta site area was overlaid with a relatively loose "drift sand" surface ranging in depth from 2 to 4 feet depending upon location. This sand is not actually drift sand which has been moved by gradual ground advance, like a dune in migration, over the surface. We believe that the surface sands that occur at La Venta have been transported by strong norte winds which have picked up the sand from the exposed beach dunes on the Gulf coast and deposited it in precipitation. We have noted on many occasions after heavy rain at La Venta, while we worked despite the drenching, that our clothing was full of sand, and assume that this has come with the rain. Over years, decades, centuries, and millennia, the result has been the formation of a loosely laid sand surface on La Venta. Where it is lacking we assume that washing has removed it and deposited it elsewhere, and where it is abundant we assume that conditions were favorable for its deposition and retention. In any event, it is clear that since the La Venta site was abandoned by its makers some natural process has caused the deposition of the layer of sand - which is from two to three, and at times four feet thick - on top of the site structures (cf. pl. 6c). We noted in the section of the site we are presently concerned with that the familiar surface sand layer occurred. Since this is relatively soft, we decided to experiment with steel probes which we had made at an ironmonger's shop in Coatzacoalcos. These were fashioned from round iron rod half an inch in diameter and with an 18 inch T-handle welded on one end. These penetrate the upper sands quite readily, and when the sharpened tip encounters a stone or the tighter clays beneath, its progress is impeded. We are conscious of the disapproval of some of the use of such steel probes, but at La Venta nothing can be harmed by such tools, and when one is short of time it is a useful alternative to blind exploration by trenching through sterile overburden.

Employing the probes, we examined the cleared area about which we are speaking, and soon encountered numbers of stones at a depth of about 3 feet. Suppressing our curiosity, we continued the probing and marked each spot where stone was struck with a sapling stake. After a day we were working in a maze of stakes, and only then decided to examine the nature of the stones which had been encountered by the probes. All of this was done in the last ten days of our investigation, so our report on what we discovered, and our estimate of what remains to be brought to light, must be judged by this very brief period of examination.

Not far to the northwest of the columns discovered by Stirling in 1940 (see Plan of La Venta Site map) we found a concentration of buried stones. Opening this area by shoveling off the surface sand layer brought us to the surface of what were clearly construction clays, and lying on and in the upper members of this clay layer were a profusion of stone sculptures (Monuments 39, 40, 41, 44; see site plan map). This excavation was begun with

some trepidation since we felt that we were risking the strong reaction of the Delgado Municipal who had warned us of severe penalties if we overruled his order to refrain from excavation. However we decided to take the risk, and proceeded to dig. The Vigilante was, by usual country Mexican standards, unusually efficient, and within an hour of the exposure of these pieces, and while we were attempting to record their occurrence in notebooks and with the camera, we were honored with what was probably the most overwhelming display of local political power that has ever been exhibited at La Venta. About thirty persons, all "official" in varying degrees, descended upon the excavation and we were soon in the middle of - to use a now-hackneyed term - a confrontation. The Delgado insisted that the sculptures belonged to him; we demurred, saying that according to our Concesión we were responsible for them and could not deliver them to him. He countered by saying that if we did not surrender them he would forthwith clap all of us into his jail; we answered that if he insisted upon this he must then sign a document in which he assumed full responsibility for his seizure and the safekeeping of the monuments. He retorted that not only was he not going to sign any paper but that since the sculptures were already in his possession that we were going to deliver them to the Delagación, and that if we did not we were going to be clapped in the jail. Under the circumstances there was nothing else to do but agree that he held the winning hand, so we transported the seized sculptures (no small task since they weighed in at about 1200 pounds) to the municipal headquarters. What else can one do when faced with such alternatives? We had one bad moment in the process when we failed to believe that the Delgado was serious about also wanting a rough chunk of bright green schist, weighing about 50 pounds, carried to his headquarters. Our failure to understand that he believed this to be a piece of jade (his knowledge of petrography probably being limited to the observation that rocks come in several colors) convinced him that we were refusing to release the piece and we were only with difficulty able to allay his hostility. We were certain that we were on good legal grounds for objecting to his confiscation, but since he was representing one hundred per cent of the law at La Venta on that day, and on the site at that moment, and he was supported by two score adherents, all armed with .45 automatics, we thought it the wisest course to submit to overwhelming authority and firepower. At this point we attempted, through Arql. Hernandez and Arql. Contreras, to gain some outside support, and this we did through a series of telephone calls and telegrams to state officials in Villahermosa and federal officials in Mexico City. We did receive some support, mainly in the form of an official visit of the Superprocurador (roughly, the Attorney General) of the state of Tabasco, who examined our documents and affirmed our official right to be at La Venta and to be making our investigations. In the end (although it was almost literally the end because our time to close down the work and return to California was only a few days away) we achieved a stand-off.

While all this was going on, and in the hope of avoiding further exacer-

bation of what can only be called an undesirable amount of attention to our work, we decided to risk everything and dig to examine the nature of other stones which had been encountered by the T-handled probes. First, we discovered something entirely new: the U-shaped drain (Drain No. 1) running in an east-west direction and situated toward the eastern edge of the elevated area where we were so happily (and unhappily) engaged in exploration. Then, in succession, in a matter to two days came the discovery of the stone bowl (Monument 45), Drain No. 2 (with its fragmentary stone bowl, Monument 55), Drain No. 3, and Drain No. 4. And there we ended, our time having run its course—with the local newspapers publishing inflammatory accounts of our doings and the Delgado in possession of eleven of our monuments which we had only briefly seen before they were impounded.

During the brief time (in retrospect it seems a very long one) we were engaged in the controversy over whether we had a right to excavate, and when we did excavate and find sculptures, to whom the sculpture belonged, we had a work crew standing by. We had them continue to clear the vegetation (this was considered a non-controversial activity) and dig trenches or pits in areas where we hoped no important finds would be made. Since the stone drains did not seem to excite the acquisitive envy of the Delgado (we are thankful that the igneous rocks are not colored green), we exposed Drain No. 1 in its entirety, and extended the trench in which it lay both to the east (toward the south edge of the Acropolis) and to the west, during which process we encountered Monument 45 and Drain No. 5. We also collected charcoal for radiocarbon dating from identifiable features and levels as we were excavating. The few ceramic samples found in this area are described in Appendix I; the monuments discovered here (Nos. 39-46, 55, 57) are described in Appendix II.

Drain No. 1 (pl. 5): The 1955 excavations at La Venta had produced a green schist piece which was L-shaped in cross section (Monument 24) and reminiscent of, but not identical to, the U-shaped trough stones with open ends that had been discovered by Stirling some years before at the San Lorenzo site. In the La Venta site proper (i.e. Complex A) no drain stones have been recovered. M. Coe, who has been conducting a reinvestigation of the San Lorenzo site, has learned that in that site there are a number of drains composed of lines of U-shaped troughs laid end to end and covered with dressed stone slabs (Coe 1967). In the light of the many duplications known to exist between La Venta and San Lorenzo, it seemed unusual that such stone drains were lacking at La Venta. At the same time, each of these sites has produced some forms (e.g. the pyramid at La Venta; the stone ball at San Lorenzo) which are peculiar to one or the other locality, and the possibility remained that the San Lorenzo group was interested in stone-lined conduits and the La Venta group was not. We were therefore more

interested than surprised to discover a drain made of U-shaped blocks of gray vesicular basalt near the eastern margin of the Stirling Group Acropolis. The drain consists of 16 troughs and seems to be complete. All are Type III (fig. 3, pl. 4d). The stones range from 47 to 50 cm. in length and are consistently 42 cm. wide. The intake of the drain at its west end has been added to, using available emergency materials rather than shaped troughs (pl. 5c,d). A section of a basalt column laid lengthwise forms one side, and two limestone slabs set on edge form the other side (fig. 2). A partial cover is formed by a trimmed sandstone slab, and the intake is closed off with a schist block. Whether this is a headgate mechanism which was blocked with the schist slab, or whether the drain made a turn to continue to the north through the opening between stones h and f in Figure 2, we do not know. There is one gap in the otherwise continuous run of trough stones, the gap being number 13 counting east from number 1 shown as a in Figure 2 (cf. pl. 5a). Here some flat, palm-sized pieces of white limestone have been set up on edge on either side to contain the flow. The joints where two troughs were set end-to-end were sealed with asphalt, traces of which can be seen at nearly every juncture. Some portions of the drain are covered with partly trimmed stone slabs of limestone or andesite. There are four such cover stones: one covering trough number 2 near the west end; three in a slightly separated group just east of the center of the run of the drain; and one at the east end (pl. 5a-d). Since the drain had been laid down and covered with some kind of red-yellow clay construction and was filled level with the top of the trough stones with a blue-gray gumbo

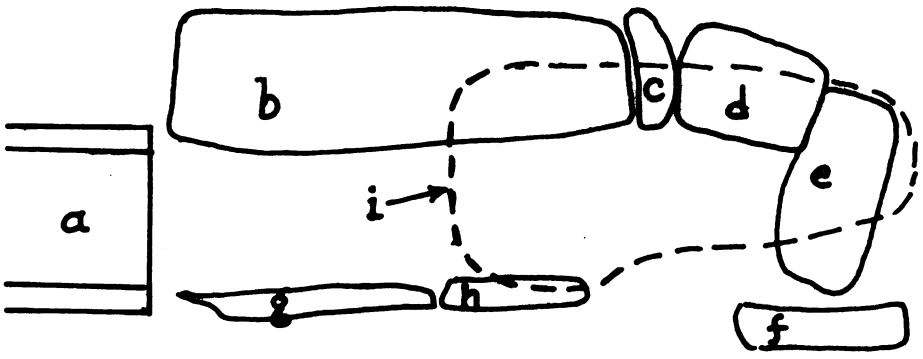


Fig. 2. West end of Drain No. 1. a, U-shaped trough stone; b, basalt column; c, f, andesite metates; d, unworked schist block; e, schist block; g, h, limestone slabs; i, outline of sandstone cover slab.

(pl. 5a), it is clear that the drain channel had been covered while it was in use. The only reasonable explanation is that wood or some other perishable material which has left no discernible trace was employed for this

purpose along its course where stone was not used. The total length of the drain is 39 feet (11.89 m.). It was exposed and noted and then covered again to preserve it for future investigation. The fall of the drain from west to east is 34 inches.

Drain No. 1 appears to have been covered over by a low clay mound structure, the dimensions and function of which we are quite ignorant about. The mound structure may have been a raised edge or border or levee surrounding an open tank or reservoir. A trench continued to the west from the west end of Drain No. 1 gives good evidence that a depression of about 5 feet existed here. The bottom slope is gradual, increasing in depth about 3 inches per foot until it reaches maximum depth at about 20 feet west of the end of Drain No. 1. West-east width of the depression or reservoir at the point of our trench cutting is about 50 feet, and it appears that the depression deepens to the north since the sand infilling is slightly deeper on the north wall of the trench than on the south wall.

On the east edge of the presumed reservoir, at a distance of 60 feet west of the west end of Drain No. 1, we found a large stone bowl (Monument 45) made of andesite. Beside it lay what we take to be its lid or cover, in the form of a round sandstone disk 42 inches in diameter and 3 inches thick (pl. 6c). The bowl and its lid were encountered during excavation of the trench which was run to the west as an extension of the trench in which Drain No. 1 was exposed. No other features that can be associated with the bowl occur in the immediate vicinity, and the best we can do at this time is to suggest that the stone bowl was sitting on the edge of the open pool. The bowl was imbedded in the upper part of the red and yellow mixed construction clay, and the lid lay on the surface of the clay fill. The lid was covered with, and the bowl was filled with, surface drift sand, and it appears that when the site was abandoned, the slow process of sand deposition which ultimately covered the stones began. The sand here has a depth of 30 inches.

In the lower part of the surface drift sands and above the clay construction surface, we found at a distance of 8 feet east of Monument 45 a ring of stones, mostly half metates, 5 feet in diameter (pl. 6c). Inside the circle was a thick layer of almost pure wood charcoal. M. Coe suggested that it was a temescal, and this seems possible. Samples of the charcoal have been radiocarbon dated at Yale (Y-2378) as 1370 $\pm$ 80 years B.P., and at UCLA (UCLA-1350) as 1150 $\pm$ 80 years B.P. We believe that its presence is fortuitous and has nothing to do with the Olmec occupation of the Stirling Group. The fact that it lay in the upper drift sands also shows this to be the case.

Drain No. 5 (pl. 6a,b): In the same trench in which Drain No. 1 and Monument 45 were found, and at a point 10 feet west of Monument 45, we encountered another drain. This is incomplete, probably due to removal in ancient

times of some of the trough stones, but the one which we discovered is in place and is covered with a roughly rectangular slab of sandstone. In form it is so unusual that we assigned it a monument number (No. 46). It is made of fine-grained gray andesite, weighs about 125 pounds, and bears at each end two "female" mortise-steps into which, we assume, fitted "male" tongues or tenons (pl. 6b).

Drain No. 5 was buried deep in construction clays and was inclined to the west at a fairly steep angle. Like the trough stones of Drain No. 1, the channel was firmly packed with a gray muck quite unlike any of the surrounding soils. Beyond this single trough, and exposed in the vertical trench wall, was a continuation of the same gray clay, but no evidence of a trough stone or other imperishable side, cover, or bottom elements was noted. A broken metate set on edge seems to have supported the end of the trough stone (pl. 6a). This trough is classified as Type I (fig. 3). We believe that Monument 46 marks the terminal element of a once longer drain which emptied into a plank-lined conduit. Like most features we encountered in the Stirling Group, we cannot at the moment determine its point of origin or destination, or how it may have been associated with other drains, or the water source from which it originated.

Drain No. 2 (pl. 7a,d): About 130 feet west and a little south of Drain No. 5 we found another sluice, Drain No. 2. This consisted of four trough stones set in a line and dipping sharply down to the east. The fall amounts to 23 inches in a distance of 9 feet. The trough at the west end lay in the upper drift sand, the three which lay east of it were covered with construction clay. Just above stones number 3 and 4 was a stone bowl (Monument 55), similar to Monument 45 except that it was represented by about one-third of the original bowl and was smaller and less well fashioned. There are two unusual features of Drain No. 2. First is the profile of the stones which are somewhat wedge-shaped and have a channel which seems disproportionately narrow and shallow. These are classed as Type II (fig. 3). They range from 60 to 80 cm. long and are 33 cm. wide and 30 cm. high. Second is the fact that all four of the troughs are inverted so that they lie with the flattened base up and the water channel opening down. The fact that they lay imbedded in solid clays which showed no detectable sign of disturbance and are aligned in what would seem to be working arrangement, indicate to us that they may have originally been set in this way, perhaps lying on wooden planks to form a continuous and open sluiceway. The cover of dense clay fills may have been sufficient to seal the joints and prevent escape of the water in the joint between the base of the stones and the (assumed) wooden base. The matter of whether the drains were in their original situation could not be settled beyond question by our group, but later archaeologists will find this drain, barring disturbance by site looters, in its original position and can answer this. Our opinion is that the drain troughs are in their original position.

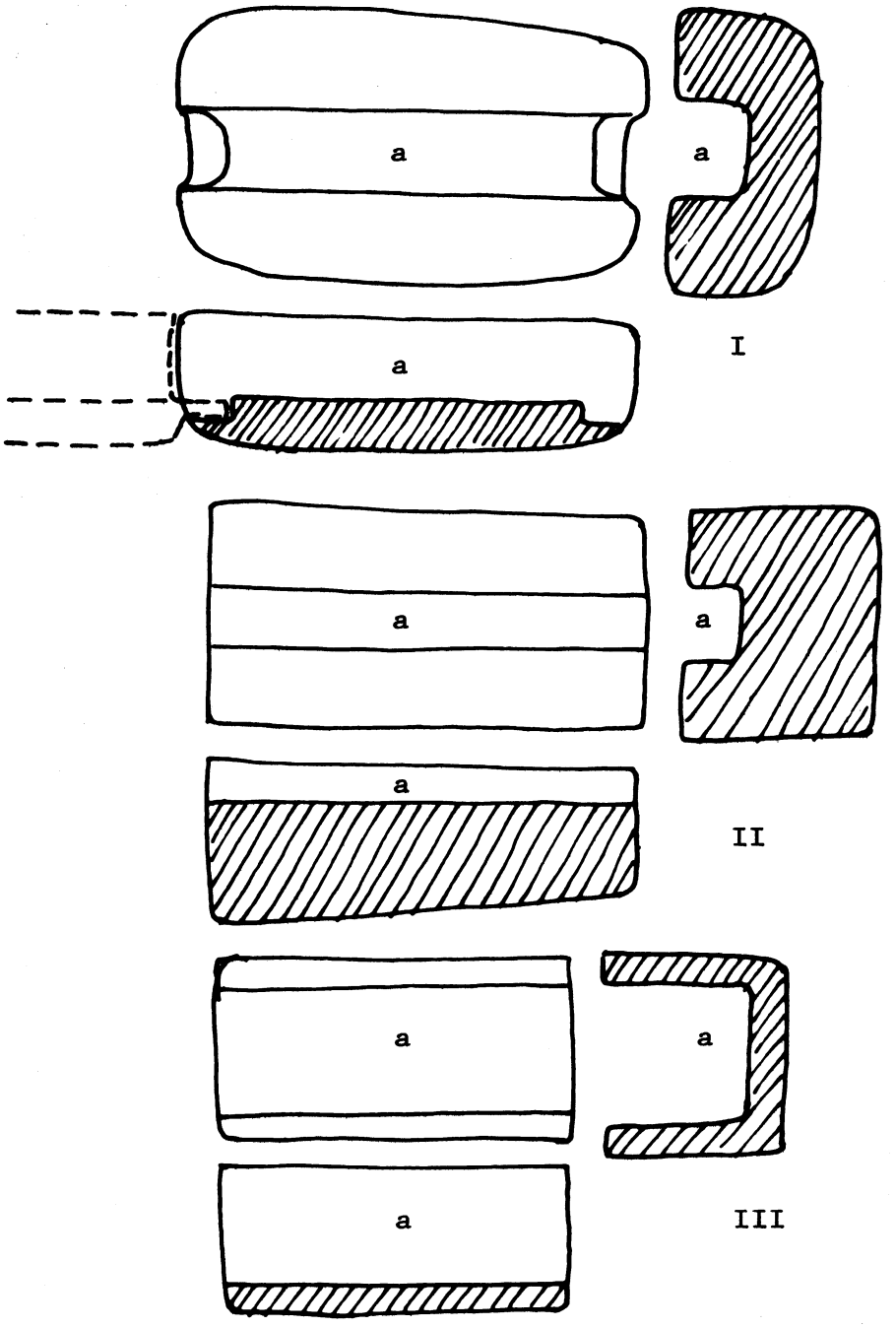


Fig. 3. Major types of trough drain stones
a, water channel

Four stones, which can be seen in Plate 7a, may have been some kind of "headgate" mechanism, although how this would work is beyond our ability to guess. The two flat-lying stones are a semi-dressed piece of green serpentine and a flattened cobble of andesite. The two stones standing on edge are a broken andesite metate and a fragment of the base of the stone bowl (Monument 55) which can be seen in the background.

Drains No. 3 and No. 4: A short distance to the northwest of Drain No. 2, and running at right angles (i.e. north-south) to the line of Drain No. 2, was a double drain which is interesting because it also proposes inconsistencies. Both drains are incomplete, having been disrupted by removal of some trough stones in ancient times. Although both drains are in line (see Plan of La Venta Site map), one of them (Drain No. 3) has the sluice channels in normal (i.e. for us) position (pl. 7b), While the other (Drain No. 4) resembles Drain No. 2 in having the troughs inverted with the flat bottom uppermost and the channel facing down (pl. 7c).

Drain No. 3 runs for a total length of 15.75 feet (4.8 m.) and consists of four Type III drain troughs (fig. 3), two of which are covered with roughly shaped sandstone cover slabs. A stone set at right angles to what may have been the opening may be part of a "headgate" mechanism (pl. 7b). If this is the drain intake, we can determine only that it originally continued to the south. It is possible that Drain No. 3 made a right-angled turn to join with Drain No. 2. Drain No. 3 sits on top of the construction clays and is here covered by about 2 feet of surface drift sands.

Drain No. 4 lies in line with, and to the north of, Drain No. 3. The trough stones are also of Type III, and there are five present. Counting from south to north and assigning numbers to the spaces where stones are lacking, Nos. 1, 3, 4, 5, and 7 are present; the places that should be occupied by Nos. 2 and 6 are vacant. At a point 6 feet west of trough stone No. 1 of Drain No. 4, we found two inverted trough stones butted together, and although they are of Type III, their lengths are not the same as the two gaps in Drain No. 4. If they are the two missing trough stones, it would appear that some of the apparently in-place stones of Drain No. 4 have been shifted. The two inverted trough stones in question could just as well have come from Drain No. 3, or even from some other drain which we did not find. The general impression we have is that as the drains lay exposed on the site surface, and before they were covered with the surface and mantle, persons unknown and motivated by equally unknown purposes disturbed the trough align ments. In Plate 7c, the closest drain trough (No. 1) has three rough stones set on edge, perhaps also part of some operational mechanism which we refer to as a "headgate," and which has been noted also for Drains No. 2 and No. 3

The trough stones in Drains No. 3 and No. 4 range from 60 to 70 cm. in length and are 32 to 36 cm. wide.

We are inclined to believe that some of the Stirling Group drains were originally set in what we consider to be normal position, and that others were set in what we consider to be inverted position. Until more work is done to determine the number and position of drains, their function, water source, point of exit, probable degree of disruption, and relative chronology, nothing more can be said about them. M. Coe tells us that the San Lorenzo drain troughs are of our Type III, that some of them run for considerable distances, that all discovered as of February, 1968, were lying in normal position, and that all were covered either with flat, rectangular, well-dressed basalt capstones or with inverted trough stones which would have the effect of doubling the water-carrying capacity. We also believe that there may have been wood used as part of the drains in some cases; for example, the probable plank base on which the inverted troughs of Drain No. 2 were laid (and possibly, but less probably, also those of Drain No. 4). The reader will also recall our arguments for wooden drain covers for clay-covered Drain No. 1; these would also apply to Drain No. 3, but in view of the probability of this feature having been disturbed, some stone covers may have been removed.

It is even possible that the gaps which are present in the line of trough stones of Drain No. 4 were never occupied by stone troughs, but by surrogates of wood; further, that the continuation of Drain No. 3 to the south may have been by means of a wooden flume or wood-lined ditch. The intake to Drains No. 3 and No. 4 could have been by a wood-lined race. We simply do not have answers, but sense that wood and stone may have been used together in some of the Stirling Group drains.

About 15 feet north of the northernmost (No. 7) trough of Drain No. 4, we found three rectangular sandstone slabs lying beneath the sand and on top of the clay surface. While these look like drain covers (e.g. those of Drains No. 1 and No. 3), they may with equal plausibility be considered as drain bottoms upon which were laid inverted drain troughs. Two of the end-to-end slabs are precisely in line with the north-south run of Drains No. 3 and No. 4; the third slab turns at right angle to the east and thus indicates (assuming that these are in their original position) that a drain here made a right-angled bend.

Drains No. 3 and No. 4 were discovered only the day before we left La Venta, and on the last morning of our work we barely had time to clear the sand overburden, make brief notes, and take photographs in the available light, before leaving the spot.

Age and Relationships of the Stirling Group

What we are able to say about the Stirling Group at La Venta, and its contents, is not very much, and it is also tentative. Our investigation was so brief that its main accomplishment is best stated as the discovery of the Group and the likelihood that it contains numbers of undiscovered stone sculptures and drains. The details of the stratigraphic situation and architectural plan all remain to be elucidated.

We made collections of charcoal for radiocarbon dating, and have thus far secured the following results

Sample No.	Age	Location in Stirling Group	Comment
UCLA-1350	1150 ± 80 B.P. (800 A.D.)	Near Monument 45; lying in surface drift sands.	Suggested "temescal" (see p. 146)
Y-2378	1370 ± 80 B.P. (580 A.D.)	Ditto	Ditto
UCLA-1351	2460 ± 80 B.P. (510 B.C.)	Pit 9 (depth 40-42 in.) which produced Monuments 39-41, 44 (see Plan of La Venta Site map). From gray layer just beneath uppermost red-yellow clay construction layer.	Age acceptable; must date last or next to latest construction on site. Compare with UCLA-1283, -903, -1287 which are averaged to 600 B.C. This age taken as probable abandonment date of Complex A, La Venta.
UCLA-1352	2100 ± 80 B.P. (150 B.C.)	Same as UCLA-1351 (depth 46-49 in.). From red-yellow clay surface immediately below surface drift sands, and immediately below clay layer producing sample for UCLA-1351.	Sample too small to fill counter. Age probably too young; compare to UCLA-1351 from clays immediately above this sample.
UCLA-1355	2900 ± 60 B.P. (950 B.C.)	From depth of 10 ft. at point 30 ft. W of west end of Drain No. 1 Abundant charcoal in clean white sand structure fill. Sample collected at water table level. Base of construction fills lies indeterminately deeper than this level.	Acceptable age. Compares with Phase I of La Venta site.

Sample No.	Age	Location in Stirling Group	Comment
UCLA-1356	1940 ± 80 B.P. (10 A.D.)	Test Pit No. 1968-8 (see map p. 154). Collected from depth of 190 cm. below surface.	Age not acceptable. From 1 m. deeper than sample UCLA-1253 dated 3050 ± 90 B.P. which was collected 10 ft. distant. Judging from cultural associations and stratigraphy, this sample should have an age in excess of 1000 B.C. since ceramic association is San Lorenzo (see Coe, Diehl and Stuiver 1967) and sample lies well below UCLA-1253.

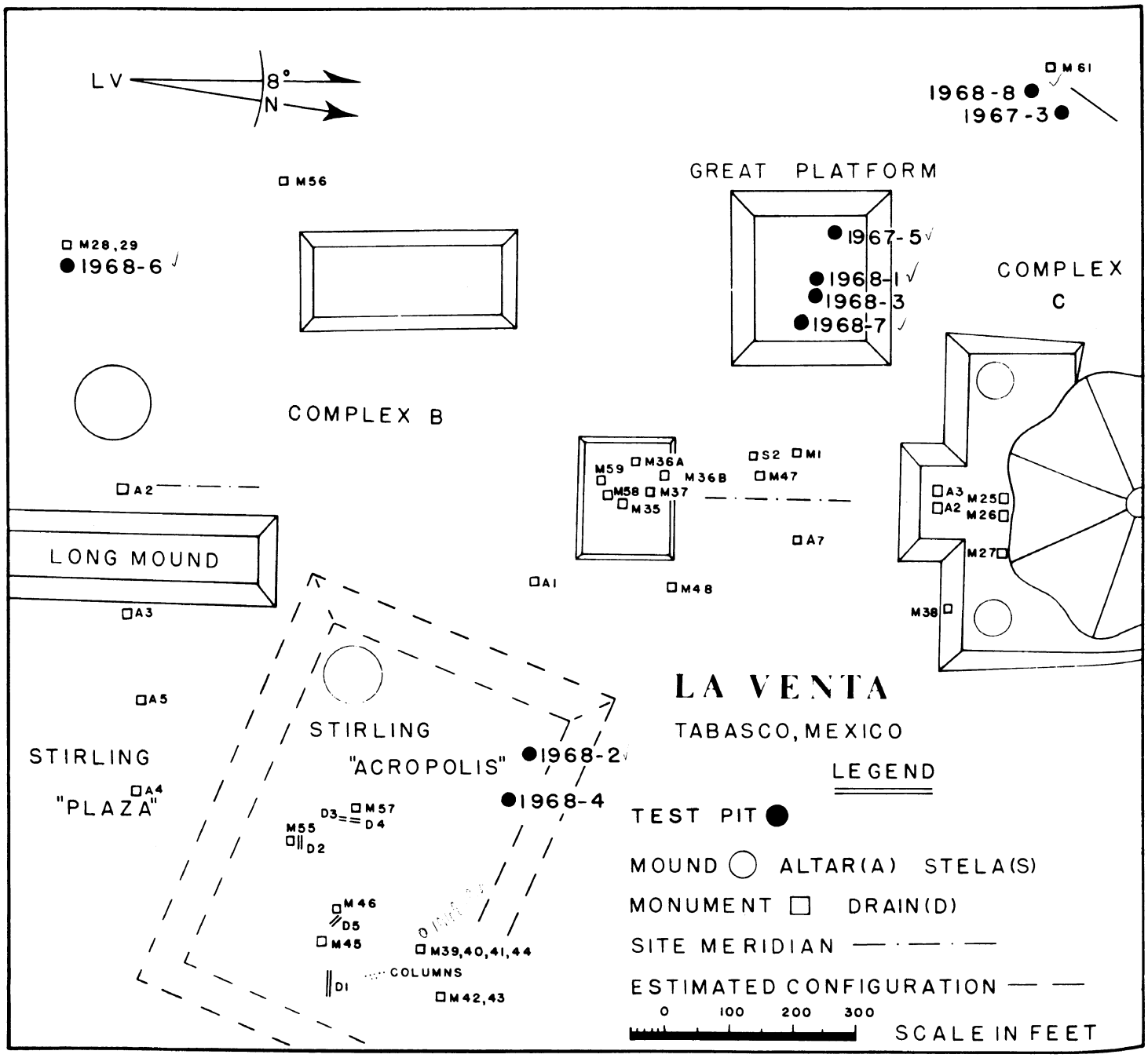
We can conclude from C-14 dates now available that the Stirling Group is contemporaneous with the La Venta site. When the Acropolis is excavated to base and charcoal recovered, it may be found that construction began here earlier than La Venta Phase I. The Stirling Group does not seem to have been abandoned earlier or later, but at just about the same time as Complex A. The extensive use of white limestone slabs, basalt columns, and the presence of various special forms of stone blocks fashioned from serpentine and basalt (e.g. precisely those forms used in the Southwest Platform adobe brick structure; illustrated in DHS 1959, pls. 12, 13) are all duplicated in the La Venta site Complex A. Some of the sculptures from the two locations are similar, but there are many differences. These need not indicate temporal differences since so much of Olmec sculpture consists of unique pieces. Similar construction clays were used in both the Stirling Group and in La Venta Complex A. Absence of U-shaped stone drain troughs in Complex A may mean that they do not occur there, but it may also be true that they do occur but have not been found, since there has been practically no excavation outside of the basalt-column enclosed Court where one might expect to find such drains to carry water out of the Court.

We see no reason to suggest that the Stirling Group is the same age as that level of the San Lorenzo site in which stone drains occur, and indeed the radiocarbon age of the uppermost clay layers at the Group (almost 500 B.C.) would indicate that the latest building here, as well as the associated

drains and sculptures, are later than the end of the San Lorenzo phase as presently dated at San Lorenzo site. UCLA-1351 can be interpreted as showing that Complex A of La Venta and the Stirling Group Acropolis were abandoned at about the same time.

On the other hand, the Stirling Group Acropolis may have been the designated spot where open reservoirs (perhaps like those which occur at San Lorenzo) were located, and the drains may have been associated only with such open pools. To mention these matters as things which we have no answers for presently is only a roundabout method of stating that they are problems for future investigation.

Our present guess is that the Stirling Group is one section of the total La Venta site, that it was an area of the Ceremonial Center devoted to particular activities (e.g. ball playing, and whatever water-connected rites may have been associated with the reservoirs, drains, and stone bowls). One altar (No. 4) was found in the Plaza of the Stirling Group, but no colossal heads have been found in association. However, the area has barely been looked at, and a search for its limits and exploration of its buried features may, and almost certainly will, bring to light all sorts of new and interesting finds as well as interesting and familiar forms.



Map 1. Test pit locations

APPENDIX I

LA VENTA CERAMICS, 1968

P. S. Hallinan, R. D. Ambro and J. F. O'Connell

During the 1968 season at La Venta eight test pits were dug in various areas to the south of the great pyramid. The purpose of this excavation was to sample the ceramics of the area under controlled conditions and to cross-check the results with the available data as to the nature of ceramics found at the site, and the possible presence of an earlier phase at La Venta in light of recent discoveries at San Lorenzo which establish a "pre-La Venta" ceramic complex called "San Lorenzo" (Coe 1967).

To this end six test pits (Nos. 1,2,3,4,5,7) were laid out south of the pyramid on what appeared to be two long ridges running on a north-south axis on either side of the centerline. The designations for these pits are prefixed by "1968" (e.g. 1968-1, 1968-2) to indicate the year in which they were excavated (see map 1). For convenience the prefixed year has been omitted in the following discussion.

The pits measured 3.0 by 1.2 meters and were dug in arbitrary levels of 20 cm. Due to the clayey nature of the soil encountered, screening for sherds was impossible, and they were gathered by carefully sorting through the back dirt as each shovelfull was removed from the excavation. This fact is mentioned because of the ever-present possibility of selective collecting, although there was a conscious attempt to avoid this. In all the pits the sherds found were in a poor state of preservation, and their poor condition increased as deeper levels were reached. Sherds were generally found to be small in size and badly eroded, to the point that any slip or paint that might have been on them would have long since disappeared. In fact, it was a frequent experience to remove a sherd from the matrix and observe a color (usually a bright red) remaining affixed to the enclosing clay, with little or nor color left on the sherd itself.

Both of the ridges chosen for location of the test pits were heavily overgrown and were only brushed in the immediate area of excavation. This proved to be the undoing of the primary purpose of the test pits. They were excavated down to what appeared to be a sterile red-yellow mottled clay encountered at depths varying between 185 to 210 cm. This clay had an uneven surface in pits 1, 5, and 7 on the ridge west of the centerline. This ridge, as was true of the entire site, was covered by a blanket of drift sand, dark for the first 30 to 40 cm. and lightening until a clay level, usually between 80 and 100 cm., was reached. Sherds were encountered in the sand but became far more frequent as the clay was reached, with what appeared to be a definite level—heavy in

sherds and carbon - encountered at approximately 130 cm. There was evidence of disturbance throughout, pits with charcoal being common and extending from the sand into the clay, and from clay level to clay level. The levels themselves were extremely uneven within the individual test pits.

On the next to last day of the field season, Petroleos Mexicanos afforded us the use of a helicopter for aerial reconnaissance and photography. For the first time we were able to view the sites of the six pits from the air and immediately realized that what we had felt were natural ridges were in reality enormous rectangular earthen platforms. The test pits had barely penetrated the surface of these structures. What we had assumed to be naturally deposited clay was probably clay construction fill similar to that found during the excavation of Complex A in 1955 (Drucker, Heizer and Squier 1959).

The ceramics encountered in these pits fall well within the range of "La Venta" wares described by Drucker (1952). There appear to be no differences in the wares themselves, although a few wares of paste or decoration distinct from that described by Drucker were encountered. These, however, were small in number and insignificant in the total ceramic picture. They are indicated by starred entries in the tables below.

Test pit 1 produced 213 flat-based, flaring-sided dishes, simple direct rims being most common in the upper levels with an increase in wide everted and thick beveled rims at greater depths. Only 18 tecomate fragments were identified in the entire pit; they were slightly more common in the lower levels. Jars and bowls were present in all levels, increasing in proportion to dishes with depth. Of the sherds recovered, approximately 30 per cent were fine paste, higher in frequency in the upper levels and decreasing in the lower levels.

Two ceramic pieces from the 120-140 cm. level in pit 1 merit discussion. The first is a squat, shouldered bowl with a flat bottom and straight, vertical neck (pl. 8d). It is 10 cm. high and 13 cm. in diameter. The paste is finely tempered, and the vessel is gray on the outside and orange in the interior, due to firing technique. No signs of slip are present. The most significant feature of the vessel is the head of a monkey projecting from the upper part of the shoulder. The head has the typical swollen conical forehead seen frequently in Mesoamerican representations of monkeys. The ears, eyes, and nose are softly modeled, with a minimum of incision used in the ears and mouth. The head is solid, with no perforation for a spout; the tenon of the head is still visible on the vessel's interior.

The second piece from the 120-140 cm. level is a coarse orange figurine of a seated old woman (pl. 8a,b,). The figure is 9 cm. high and 9 cm. long

from the buttocks to the ankle of the left foot. The right arm and leg, as well as the left foot of the figurine, are missing. It has been classed as Type II (Drucker 1952). All details are delineated by incision, no punctation being used. The sunken cheeks and flaccid, empty breasts clearly portray old age. The woman is seated with her left leg extended. The torso is rotated almost 45 degrees, and is bent forward to allow the left hand to rest on the calf of the extended leg. The head is turned slightly to the right. As the missing arm and leg are broken off at the torso, their positions can not be reconstructed.

Test Pit 1: Wares

Depth (cm.)	0-20	20-40	40-60	60-80	80-100	100-120	120-140	140-160	160-180
Coarse buff	12	29	24	11	9	207	154	78	48
Coarse brown	56	82	91	145	105	143	260	368	177
Coarse black	3	9	9	12	15	49	89	63	42
Coarse white							1	24	6
Coarse red	17	7	2	6	2	14	41	5	5
Brown lacquer	4	7	1			27	14	3	1
Fine buff-orange	35	60	46	22	17	7	21	81	32
Fine gray-black	21	50	51	40	28	39	98	98	22
Painted		2		5			5		
Fine brown*			1						
Red slipped fine orange*				5	1				
Fine pink-red slip on white slip*								1	1
Fine white*								7	
Black rimmed buff ware*									1

*Ceramic types not noted by Drucker (1952)

Test Pit 1: Vessel Shapes

Depth (cm.)	0-20	20-40	40-60	60-80	80-100	100-120	120-140	140-160	160-180
Dishes (untypable)				1	3	1			6
Flat dish, flat base, flaring sides, simple direct rim		2	2	3	2	22	40	14	8
Flat dish, flat base, flaring sides, thick beveled rim				1	5	30	27	17	17
Flat dish, flat base, flaring sides, wide everted rim			1 thin evert		1	3	5		
Incurved, simple rim								1	
Straight side, simple rim								1	
Bowls									
Incurved, angular shoulders									1
Incurved, returned sides							1		
Small, rounded			1	2			3	13	3
Jars									
Neckless, thick, direct rim							2		
Upleaned neck		1				4	2	8	3
Concave (returned) neck				1					
Cylindrical				1					
Tecomates			2			1	9	5	3
Miscellaneous									
Comal				1					
Pot rests								2	2
Handles									1

Test pit 5 was dug one meter to the west of pit 1. The top meter of drift sand was removed and sherds were collected beginning at 100 cm. As in pit 1 and the other pits, the sherds were in poor condition and very small. What was found approximated that of pit 1. There were 139 flat-based, flaring sided dishes, all but 39 with simple, direct rims. Only 18 tecomate fragments were discovered, distributed randomly throughout the trench. Bowls and jars are also present, more frequent in the upper levels. Sherds of fine paste, which make up about 25 per cent of the total collected, decreased percentagewise at lower levels. This may have been due in part to the state of preservation and tendency for the fine paste sherds to virtually disintegrate in the clayey soil.

Test Pit 5: Wares

Depth (cm.)	100-120	120-140	140-160	160-180
Coarse buff	58	146	189	41
Coarse brown	299	129	120	88
Coarse black	72	60	22	25
Coarse white	7	3	2	4
Coarse red	1		10	
Brown lacquer		2	9	4
Fine red*	1			
Fine brown*	2			
Hard coarse brown*			5	1
Fine buff-orange	109	31	13	12
Fine gray-black	56	13	12	7
White rimmed blackware*			8	
Painted				

*Ceramic types not noted by Drucker (1952)

Test Pit 5: Vessel Shapes

Depth (cm.)	100-120	120-140	140-160	160-180
Dishes (untypable)	7			1
Flat base, flaring sides, simple direct rim	16	26	43	8
Flat base, flaring sides, thick beveled rim	9	9	15	2
Flat base, flaring side, wide everted rim		2	1	1
Open curved side, thick rim			1	
Straight side, simple rim		1		
Bowls				
Incurved, returned sides	2			
Small, rounded	12		1	
Jars				
Neckless, thick direct rim	1			
Upleaned necks				1
Concave (returned) necks	12		1	1
Cylindrical				
Tecomates	4	8	2	2
Miscellaneous				
Pot rests		2		
Comales			1	

Test pit 7 was located some 15 meters east of pit 1, on what appeared at the time to be the highest point on the ridge. The first 80 cm., consisting of drift sand, were removed and a lens of mixed asphalt and burned yellow clay covering the north edge of the trench was noted. This may have been a floor of some sort. This lens was also underlain by more of the same drift sand. Unusual concentrations of sterile yellow and orange clay were encountered before we reached sterile red-yellow mottled clay at 220 cm. In light of later information on the nature of these ridges, these concentrations were probably fills used in construction.

There were few diagnostic sherds, all of those found being in poor condition. There were 49 flat-based, flaring-sided dishes, 25 of these having wide or thickened rims. Only 2 tecomate fragments were discovered, and about 25 per cent of the paste was fine. At a depth of 200 cm. three sherds of a coarse paste red ware were discovered. M. Coe (personal communication) has identified these as very similar to sherds found at San Lorenzo.

Test Pit 7: Wares

Depth (cm.)	80-100	100-120	120-140	140-160	160-180	180-200
Coarse buff	16	5	45	77	27	1
Coarse brown	167	56	116	72	36	52
Coarse black	66	20	43	22	15	4
Coarse white	3	2	1		2	5
Coarse red		1	8		1	3
Brown lacquer	1			6		
Fine buff-orange	61	13	15	2	11	1
Fine gray-black	66	7	20	9	40	
Painted						1
Orange rimmed black ware*	1					
Coarse orange*					1	
White rimmed black ware*					1	

*Ceramic types not noted by Drucker (1952)

Test Pit 7: Vessel Shapes

Depth (cm.)	80-100	100-120	120-140	140-160	160-180	180-200
Dishes (untypable)			2			1
Flat, flaring sides, simple direct rim	5	3	1	9	3	
Flat, flaring sides, thick beveled rim	1		3	14	1	
Flat, flaring sides, wide everted rim			4	2		
Bowls						
Heavy everted rim	1					
Rounded (small)	2	1				
Jars						
Concave (returned) neck	4					
Cylindrical			1			
Tecomates				2		
Miscellaneous						
Pot rests	1					

Test pit 2 was located on the rise to the east of the centerline. This pit was dug one meter square. Here the drift sand was 160 cm. deep, at which point the walls of the pit collapsed and it was abandoned. The sherds collected include 63 flat bottomed, flaring-sided dishes, all but 7 having simple direct rims. There were 8 tecomate fragments, and 22 per cent of the paste of the sherds was fine.

Test pit 8 was located in the depression along which passes the trail from the airstrip to the southern face of the pyramid. Along the trail was a small drainage ditch, cut to a depth of 70 cm. from the surface. A carbon sample collected from pit 8 in February, 1967, produced a radiocarbon date of 1110 B.C. (UCLA-1253). A test pit one meter square was sunk and 20 cm. of backdirt from the ditch and 110 cm. of drift sand were removed without recovering any sherds. At 130 cm. a charcoal-and-sand level was encountered. Sand mixed with clay continued down to 150 cm. where a dark gray clay containing sherds and carbon was encountered. This layer was 50 cm. thick. Undisturbed clay base was at 200 cm. Carbon was collected at the 130, 150, and 200 cm. levels.

Test Pit 2: Wares

Depth (cm.)	0-40	40-60	60-80	80-100	100-120	120-140	140-160
Coarse buff	10	19	47	116	31	15	38
Coarse brown	17	66	71	86	30	63	45
Coarse black			16	6	8	2	3
Coarse white			1				
Coarse red			3				5
Brown lacquer							1
Fine buff-orange	1	21	9	6	21	30	12
Fine gray-black	3	16	10	5	1	23	7
Painted		3		7			
Red slipped, fine orange (sl)*				2			
Red slipped, hard coarse brown (sl)*				2		3	1
Fine brown						1	
Fine gray							1

*Ceramic types not noted by Drucker (1952)

Test Pit 2: Vessel Shapes

Dishes							
Flat, flaring sides, simple direct rim		5	10	14	5	12	13
Flat, flaring sides, thick beveled rim	1		2		2		2
Flat, flaring sides, wide everted rim				1			
Small, shallow, direct rim						2	
Bowls							
Incurved, returned sides							1
Small rounded			2	1		2	2
Effigy							1
Jars							
Concave (returned) necks						1	1
Tecomates		2	2	1		3	

Test Pit 8: Wares

Depth (cm.)	130-140	140-150	150-160	160-180	180-200
Coarse buff	21	23	41	38	107
Coarse brown	29	33	41	21	29
Coarse black	7	2	8	4	21
Coarse white		2	2		
Coarse red (with red slip)					8
Fine buff-orange	3				2
Fine gray-black	1				2
Hard coarse brown*		12			6
Coarse gray*		1			
Red slipped coarse paste*		1			

*Ceramic types not noted by Drucker (1952)

Test Pit 8: Vessel Shapes

Dishes					
Flat base, flaring sides, simple direct rim	4	4	4	1	4
Flat base, flaring sides, thick beveled rim			1		
Flat base, flaring sides, wide everted rim			1	1	3
Jars					
Upleaned necks					2
Tecomates	2	5	5		2

Some of the ceramics encountered in test pit 8 do not fit into Drucker's classification. Fine paste ware makes up only one to two per cent of all sherds encountered, the remainder being of coarse paste. In the lower part of the pit fine paste sherds are almost absent. The most striking feature of the ceramics encountered is the sharp increase in tecomates. Twenty-one flat-bottomed, flaring-sided dishes, all but three with simple direct rims, were found; 14 tecomate sherds were encountered, two of which were of coarse red paste with a bright red slip said to be characteristic of the San Lorenzo

phase (M. Coe, personal communication). The tecomate fragments were found at a depth of 190-200 cm. A dish with a flaring, very thick rim was noted by M. Coe as typical of the San Lorenzo phase (personal communication).

The sherds from test pit 8 were in a very poor state of preservation, making it extremely difficult to classify them as to ware. However, they came from a level considerably below the point from which the carbon that produced the date of 1110 B.C. (UCLA-1253) was collected. This, coupled with what appears to be a definite change in the frequency of wares and paste, indicates a strong possibility that an earlier ceramic complex underlies that encountered by Drucker in 1943, one that is probably identifiable with the San Lorenzo phase.

Test pit 6 was located about one kilometer south of the pyramid and several hundred meters west of the centerline, in an area which had recently been cleared by a bulldozer that removed some 150 cm. of overburden. Two sculptured monuments (Nos. 28, 29) had been uncovered during this work and sherds could be seen in the bank of the bulldozer cut.

A one meter square pit was excavated to a depth of 60 cm. where sterile clayey construction fill was encountered. Due to the press of time and difficulties encountered with the local authorities, the test pit was not excavated to a greater depth. Eighteen flat-bottomed, flaring-sided dishes were found; 7 had thick or wide rims. Only a single tecomate fragment was encountered, but six sherds of a fine paste ware with red slip on both sides were recovered; these approximate those of similar nature found at San Lorenzo (M. Coe, personal communication). About one-half of the sherds from this pit were of fine paste.

It is possible that the conditions for preservation were better in test pit 6 than in the previously reported pits, for there is a high frequency of red and white slips on bowls, dishes, and non-diagnostic sherds. One sherd of fine black paste with an orange rim, probably produced by the same method as white rimmed black ware, was found.

The other focus of attention during the 1968 field season was the Stirling Group, a newly recognized complex southeast of the pyramid. During the course of excavation of several drains and sculptures, a small number of ceramics were recovered. One ceramic test pit was begun, but we were unable to complete it due to interruption of our work by the local authorities.

The ceramic samples recovered may be divided into two lots. The first consists of a series of samples from four levels from the small ceramic test pit in the corner of test pit 9, in the immediate vicinity of Monuments 39-41,

Test Pit 6: Wares

Depth (cm.)	0-20	20-40	40-60
Coarse buff	13	5	25
Coarse brown	68	17	40
Coarse black	17		11
Coarse white	1		
Fine buff-orange	66	5	6
Fine gray-black	22	15	10
Painted		1	
Red over white slip on coarse brown*	10		
Buff-orange rim on fine black ware*	1		
Red slipped fine orange*	1		
Hard coarse brown*			1
"S.L." red slipped coarse brown*			6

*Ceramic types not noted by Drucker (1952)

Test Pit 6: Vessel Shapes

Dishes			
Flat dish, flaring sides, simple direct rim	3	9	2
Flat dish, flaring sides, thick beveled rim		1	2
Open curved, thick rim	1	3	
Bowls			
Incurved, angular shoulders		1	
Heavy everted rim		1	
Jars			
Concave (returned) necks			2
Tecomates		1	
Miscellaneous			
Leg of vessel		1	
Pot rest			1
Effigy			1

and 44. Test pit 9 was begun at the approximate base level of the sculpture. The sequence begins with the 120-140 cm. level and terminates with a sample recovered 180-225 cm. from the surface.

The second lot of ceramic samples recovered at the Stirling Group is, in reality, a random lot of sherds collected at different levels and at scattered points in the test pits excavated to expose the sculpture and drain systems. The scanty and scattered nature of the samples allows only the most general and tentative statements concerning the pottery of the Stirling Group.

The small sample of sherds from test pit 9 fits the categories of shapes and wares recognized by Drucker (1952) and ourselves in sherds from the other portions of the La Venta site. Of the 207 sherds recovered, 75 per cent were coarse wares. Coarse brown is predominant, representing a full 50 per cent of the total sample, coarse buff around 25 per cent, and coarse black less than one per cent. It is possible that coarse red and white sherds were present, but poor preservation of their surfaces would have resulted in their being placed in the unslipped categories. Approximately 25 per cent of the sherds recovered from test pit 9 were fine paste with fine buff-orange and gray-black representing 13 and 12 per cent, respectively. It appears that the fine paste sherds diminish in number in the lower levels. Miscellaneous sherds accounted for less than one per cent of the sample.

The majority of the sherds analyzed were body sherds and vessel shapes which cannot be reconstructed. Eight flat-based dishes with flaring sides, of which three had direct rims, four had thick beveled rims, and one had a wide everted rim, were identified. Sherds from two small rounded bowls were recovered, as were one cylindrical jar and one tecomate.

The second lot of samples is even more random and scanty. On the chart below (p. 170) the sherd samples have been arranged in an attempt to relate them stratigraphically.

A total of 124 sherds were recovered from construction fills at various locations at the Stirling Group. Coarse wares appear to have predominated in all samples except the group collected from the pit at the east end of Drain No. 1 which was recovered at a depth of 180-250 cm. Fine paste wares predominated at that point. Of interest are six coarse red sherds from the deep sounding 30 feet west of the west end of Drain No. 1, from a depth of 360-420 cm. These are the only such sherds encountered in the Stirling Group.

The number of diagnostic sherds is quite small, permitting only the observation that dishes again appear to be the most common. Eight flat-based dishes with flaring sides and direct rims were recovered, as were five with a thick beveled rim. One bowl with returned sides and angular

Test Pit 9: Wares

Depth (cm.)	120-140	140-160	160-180	180-225
Coarse buff	8		7	34
Coarse brown	23	36	12	34
Coarse black	1	1	1	
Fine buff-orange	14	8	3	
Fine gray-black	15	3	1	2
Red slip on white on fine buff-orange*	1			
Angular coarse brown*	1			
Red slip on fine orange*	1		1	

*Ceramic types not noted by Drucker (1952)

Test Pit 9: Vessel Shapes

Depth (cm.)	120-140	140-160	160-180	287-325
Dishes				
Flat base, flared side, direct rim				3
Flat base, flared side, thick beveled rim	1			3
Flat base, flaring side, wide everted rim	1			
Bowls				
Rounded (small)	1	1		
Jars				
Cylindrical	1			
Tecomates				1

Miscellaneous Samples from the Stirling Group

Wares

Depth (cm.)	Upper drift sands	Near Mon. 45 (d. 50)	Mottled clay covering Drain #1	Excav. for Drain #2 (d. 80)	Pit E. end Drain 1 180-250	Pit 30' W. of W. end of Drain 1 360-420
Coarse paste						
Coarse buff			13		1	7
Coarse brown	1	2	40		3	11
Coarse black			1		1	
Totals	1	2	54		5	18
Fine paste						
Fine buff-orange	3	3	10	1	2	
Fine gray-black		5	7		15	
Totals	3	8	17	1	17	
Polychrome	1					

shoulder, as well as two small rounded bowls, was found. Also present were two ring stand fragments, one tecomate, and two fragments of an effigy vessel preserving portions of an eye and a nose.

In the drift sands overlying the clay construction and presumably post-dating the construction period of the site, five pieces of ceramics were recovered. Significant was a large coarse brown jar that stands 36 cm. high and is 25 cm. in diameter at its widest point (pl. 8c). It has a tall, upleaned neck, marked rounded shoulder, and a small flat base with the lower portion of the vessel being slightly concave in profile. It was found at a depth of 67 cm. in the upper drift sands in association with mano and metate fragments, and possibly constitutes a post-Olmec cache or offering like those encountered in earlier excavations (Heizer, Drucker and Squier 1959). One small sherd of fine paste was recovered from the drift sands. It had dark orange, red, and black linear polychrome decoration, with a background of orange paste. The sherd was a portion of a dish, with a thick beveled rim. Also recovered from the drift sands were a fragment of a dish with a wide

Miscellaneous Samples from the Stirling Group

Vessel Shapes

Depth (cm.)	Upper drift sands	Near Mon. 45 (d. 50)	Mottled clay covering Drain #1	Pit for Drain #2 (d. 80)	Pit E. end of Drain #1 180-250
Dishes					
Flat, flaring sides, simple direct rim		1	5		2
Flat, flaring sides, thick beveled rim	1		4		1
Flat, flaring sides, wide everted rim	1				
Bowls					
Returned sides, angular shoulder		1			
Small rounded bowl			1		1
Tecomate			1		1
Miscellaneous					
Ring stands			1		
Hollow vessel support	1				
Effigy vessel				1	

everted rim and a hollow support for a bowl or dish. With the exception of the jar, the sherds encountered in the drift sands at the Stirling Group were of fine buff-orange paste.

The abandonment of the site, the polychrome sherd, and the hollow leg support, suggest that the drift sands and the occasional visits to the site represented by these sherds date to post-La Venta phase times. Radiocarbon samples UCLA-1350 and Y-2378 indicate some occupation of the La Venta area in Late Classic times.

APPENDIX II

NEW STONE MONUMENTS FROM LA VENTA, 1968

C. W. Clewlow, Jr. and Christopher R. Corson

During the 1968 field season at La Venta, a total of 28 previously unknown stone monuments, sculptured in the Olmec style, were encountered. Most of these were found in the course of our excavations in research of such pieces. The more portable of these particular pieces were taken to the Parque La Venta (sometimes referred to as Parque Olmeca) under the auspices of Arql. Carlos Sebastian Hernandez of the Museo de Tabasco in Villahermosa. Other pieces, such as the large columns or blocks of relatively unworked stone, were too large to be removed and so were left in situ. A small number of the monuments were brought to us by local residents who had encounterd them in the course of their daily activities at La Venta. In these cases, it was determined where the pieces had originally been found and the location was then plotted on our map. These pieces, also, were taken to the Parque La Venta.

This paper presents a brief description of each of these monuments. As this is primarily an announcement of the most recent finds and the numbers which have been assigned to them, no great detail will be given in the descriptions, nor will detail be presented as to the exact condition or associations of the stones when recovered. Many of the photographs presented here were taken under unsuitable light conditions and are utilized only as an aid in identifying numbered monuments. The position of the pieces at the time of discovery is indicated on the general La Venta site map in the rear of this volume, and it is felt that such a presentation is sufficient at this time. A more detailed description of the monuments is now in preparation.

In addition to the newly recovered pieces at La Venta, it was decided to incorporate the unnumbered pieces now at the Parque La Venta into the present reference scheme. Thus, in the future any discussion of the monuments may be conducted with a standardized numerical referent, rather than with often confusing descriptive notations. A total of 14 pieces from the Parque La Venta were thus added to the list of monuments recovered during the 1968 field season. We were able to determine the original locations of some of these (Monuments 47, 56, 59, 61) and have indicated them on the map.

Four pieces which have been in the Museo del Estado, Villahermosa, for a number of years have also been incorporated into the present numerical scheme. While the exact provenience of these monuments is not recorded, there is good reason to believe that all came from the La Venta site.

The system used here to denote La Venta monuments was first utilized by Matthew W. Stirling who pioneered the systematic archaeology of the La Venta site in the early 1940's. Stirling (1943) divided the monuments into three groups which he called stelae, altars, and monuments. Each group had its own consecutive numbering system, beginning with number one. The monument group had the largest representation, and included colossal heads, seated human figures, and most miscellaneous categories. Drucker (1952) continued to use this system in his study of all then-known pieces from La Venta. The system was employed again by Drucker, Heizer and Squier (1959) to designate the new monuments found during their 1955 excavations. Although a slightly different numbering scheme has been used at the large Olmec site of San Lorenzo (Stirling 1955; Coe et al. 1966), it is felt that the La Venta system is adequate for the corpus of material from that site. For this reason it is continued in use in the present paper; unless serious theoretical or methodological points can be raised against it, it would seem unwise to change.

In the following description of the monuments, we have employed some of the terminology utilized in a study of the twelve colossal Olmec heads (Clewlow, Cowan, O'Connell and Benemann 1967). Should the reader be in doubt as to the specific meaning of such terms as nasion, drilled pits, axe-sharpening grooves, etc., he is referred to that work for clarification of the terminology.

Monument 28 (pl. 9a)

This basalt piece is a portion of the head of a snarling jaguar, and measures 45 cm. long, 39 cm. wide, and 40 cm. high. Although broken and somewhat eroded at present, it was originally well modeled. The piece shows an open, feline mouth with large canine teeth bared in a snarl. In the mouth corners are drilled pits. The eyes are deep depressions just below the nasion which, with the upper portion of the nose, recall the same feature on the La Venta colossal heads. The back of the head was completely sculptured, with the ears depicted in low relief as laid flat against the head. That the piece had been broken off at the neck is certain, although no clue is afforded as to the position or style of the rest of the body.

Monument 29 (pl. 9b)

This piece, also of basalt, is a broken top portion of a human face and head. The line of fracture runs between the eyes and the lower end of the nose. The head wears a sort of helmet which appears rather like a turban, and is connected to a flat background which is probably a portion of a larger geometric portion of the sculpture. On the forehead and left side of the face are 13 small drilled pits which may be representations of

pockmarks or some sort of decoration. The eyes are shown as slight depressions, with the irises represented by incision and flattening. The nasion is subrhomboidal in shape.

It is possible that the piece is a broken portion of a niche figure and part of the background of a large rectangular altar such as has been reported from the site (cf. Drucker 1952). The sculpture is 37 cm. high, 26 cm. wide, and 48 cm. long.

Monument 30 (pl. 9c)

This is a seated human figure, made of basalt, with the head broken off. The right leg is crossed in front, while the left leg is tucked to the side in much the same posture as the famous Olmec "Wrestler" (Corona 1962). The toes of the right foot are crudely depicted by incising, while the left foot appears to have been only roughly blocked out. The arms arch forward to grasp the right leg. The figure wears a small abdomen wrap which is shown in low relief, and a rectangular plaque with a St. Andrew's cross (a common Olmec motif, Coe 1965:760) appears on the upper center of the chest. On the bottom of the figure are 11 axe-sharpening grooves of the type often found on La Venta monuments (Clewlow et al. 1967:71-78). The piece is 40 cm. high, 45 cm. wide, and 44 cm. at its thickest point (the base).

Monument 31 (pl. 9d)

This is another seated, basalt figure with the head broken off. Both arms are fractured off at the shoulders. The left leg is broken off at the upper thigh, the right one at the knee. No decoration or clothing appears on the piece except for the puffy rectangular incised section covering the area of the genitals. Three long sharpening grooves appear on the back, and one is present on the outside of the right thigh. The figure is 52 cm. high, 66 cm. wide, and 40 cm. thick.

Monument 32 (pl. 9e)

This is a cylindrical stone drum of welded tuff or ignimbrite, and is hammer dressed all around. It measures 64 cm. high and is 33 cm. in diameter. Two drilled pits with dimples appear on the front and side of the piece.

Monument 33 (pl. 9f)

This piece measures 41 x 39 x 32 cm., and is probably a fragment of a basalt stela. One face is carved in low relief, but it is not possible to discern the nature of the design or scene presented.

Monument 34 (pl. 10a)

Although broken and somewhat worn, Monument 34 probably depicts a large right hand grasping a more or less cylindrical object. It is made of basalt and measures 27 x 54 x 25 cm.

Monument 35 (pl. 10c)

This is a large green schist column which was shaped and dressed, but was apparently unworked except for a grooved rim 46 cm. from the north end. Its maximum diameter is 54.00 cm., and it is 3.53 meters in length.

Monument 36a (pl. 10b)

This is a large boulder of greenish schist measuring 163 cm. long, 77 cm. wide, and with a maximum thickness of about 49 cm. Twenty-one randomly placed axe-sharpening grooves appear on the east face; the rest of the piece is unworked. It is roughly fractured at the end.

Monument 36b (pl. 10e)

Lying 5.3 meters due north of Monument 36a was Monument 36b, a large piece of greenish schist. Both were once part of the same piece. It is 162 cm. long, 87 cm. wide, and 49 cm. thick. One face of the piece has about 25 axe sharpening grooves.

Monument 37

This large piece of sandstone is so eroded and covered with lichen that no features are discernible. It is 1.83 meters high, 78 cm. wide, and 28 cm. thick. At Parque La Venta, where the piece is presently displayed, it is designated No. 13.

Monument 38 (pl. 10d)

This is a badly damaged fragment of what was probably the lower right portion of a cross-legged seated figure. The piece is made of basalt, and is 48 cm. thick, 45 cm. high, and 59 cm. wide.

Monument 39 (pl. 10f)

This is a fragment of a larger monument of undetermined size and nature. The piece shows two human hands held flat against the chest; portions of the forearms and biceps are present. Above the hands a small rectangular plaque is incised against the chest. No trace of a decorative element is present. The fragment is 25 x 40 x 10 cm. in size, having been fractured on all surfaces save the sculptured one. It is made of green schist.

Monument 40 (pl. 11a)

This is a seated human figure depicted as being perched atop a throne or bench, with legs hanging down the front of the piece. The head has been broken off and the fracture worn smooth. Feet and fingers are vaguely shown. A small triangular cape is incised within the area of what would have been the shoulder blades. No other clothing or decoration is present. The piece is made of basalt, and is 74 cm. high, 46 cm. wide, and 28 cm. thick.

Monument 41 (pl. 11b)

This is a small crouched jaguar realistically carved on the front of a roundish, basalt stone rich in large black augites. The stone comes from Cerro El Vigía in the Tuxtla Mountains. This source supplied the sculptors of Tres Zapotes. This specimen is the first recorded occurrence of El Vigía basalt at La Venta. Although badly eroded, it is still possible to note that the nose is well executed and very feline in appearance, as it the mouth. No trace of costume or design is present. The piece measures 45 x 32 x 25 cm.

Monument 42 (pl. 11d)

This piece is a fragment of basalt with low relief carving present, and is most probably a portion of a stela. A hand, part of an arm, and possibly part of the leg of one human figure are clearly visible, and part of the body and leg of another may be present. No clues are available as to the scene depicted. In sculptural style and in the apparent portrayal of a large central figure flanked by smaller-sized figures, it is like Stela 2 and Stela 3 of La Venta (Heizer 1967). The piece is made of basalt, and measures 36 x 46 x 16 cm.

Monument 43 (pl. 11c)

This piece, the so-called "mushroom stool," is a short cylindrical column with a marked widening of the platform at one end. This expanded top gives the piece its character as a seat or stool. Made of hornblende andesite, the monument is 41 cm. high and has a maximum diameter of 30 cm. No design or incision is present, but one drilled pit with a dimple is apparent on the upper surface near the center.

Monument 44 (pls. 11e, 12a)

This is the most interesting and important piece to be recovered during the 1968 field season. It is significant not only as a work of art in itself, but also because of the remarkable similarities it bears to the famous Idolo de San Martín Pajapan (Blom and La Farge 1926, fig. 433; Covarrubias 1946:80) now in the museum at Xalapa Veracruz. (See pl. 15 c and 15d.) Although the

San Martín piece is complete while the La Venta monument consists only of the head and headdress, the pieces display so much in common that it would not be difficult to imagine they were the work of a single artist.

Monument 44 is a large human head atop which rests an elaborate headdress consisting of a face with decorations, and with two "were-baby" faces, one below each ear of the main human head. The main face is, unfortunately, somewhat eroded, but it is possible to see that the eyes were executed as incised and flattened, and with tear ducts present in the inner corners. The nose is broad, with the nasion subrhomboidal in form. The lips are bow-shaped and slightly parted; no teeth are showing in the mouth. The entire face is extremely well modeled and realistic.

The front of the headdress displays a large anthropomorphic face on which detail is somewhat difficult to discern due to erosion. The eyes are shown as incised, angular slits on either side of a broad, flat nose. The mouth exhibits the characteristic Olmec snarl. The gum is apparent beneath the upper lip but no trace of fangs can be detected. The chin, jowls, and the puffy flesh around the eyes are sculptured with a convincing and delicate precision.

On the sides, the main portion of the headdress was decorated by a series of upward and backward projecting parallel incised lines, possibly representing feathers. There are 10 of these lines on the right side, and 11 on the left. Below these, a head band is present, eroded on the right but shown as being divided in three identical-sized rectangular sections on the left. These sections once bore incised decoration but it is not now possible to ascertain what details were originally present.

In the back, the upper portion of the headdress is divided into four parts by the intersection of two deep V-shaped channels —one running horizontally, the other vertically — through the center. Below this, the head band is plain at the end, but in the center it supports a raised rectangular border within which is a much-worn face about which it is only possible to say that the upper lip is bow-shaped, that gums are present, and that the eyes appear to have been inset rectangles. Below this an indistinctly incised piece appears as draping on the back of the neck.

Two axe-sharpening grooves appear on top of the headdress, toward the rear. A fractured portion in the center top of the piece is probably the remaining evidence of what was once a cross-like projection, such as may still be seen on the Idolo de San Martín.

Monument 44 is 55 cm. high, 43 cm. wide, and approximately 50 cm. in length. Preliminary x-ray fluorescence tests on the basalt from which it

is made indicate that it came from the same stone source as did the basalt of the Idolo de San Martín (Dr. F. H. Stross, personal communication).

Monument 45 (pl. 12b)

This piece is a large stone bowl, 44 cm. high and with a maximum diameter of 109 cm. The sides and bottom are 8 cm. thick. Made of basalt, the piece is complete but cracked into four large pieces. Another photograph of this monument may be seen on page 194.

A large lid of badly decomposed sandstone was found near the bowl and was left in situ. The lid may be seen in the left foreground of Plate 12b.

Monument 46 (pl. 12c)

This unusual piece is a basalt drain block, peculiar for the fact that at both ends a female socket is inset into the stone. Traces of asphaltum (chapapote), presumably used for sealing the connection, remain in the sockets. The piece is 56 cm. long, 38 cm. wide, and 17 cm. high. The walls are 12 cm. thick.

Monument 47 (pl. 12f)

This monument is a long, reddish basalt column now standing in the Parque La Venta in Villahermosa. It is roughly 3.5 meters long, with a circumference of 1.4 meters. Eight small sharpening grooves are to be found near the present foot of the piece.

Monument 48 (pl. 12d)

This is a badly eroded fragment of a larger piece with nothing more than a foot crudely sculptured in the lower right corner. At one time the piece was probably a fat, squatting figure of an animal or man. Made of basalt, the fragmentary monument is 40 cm. high, 35 cm. wide, and 28 cm. thick.

Monument 49

This is a green schist column, neatly flattened on one end. It is about 2.74 meters long, with a diameter of 48.00 cm.

Monuments 50 and 51

These two pieces are large rectangular blocks of decomposed sandstone, badly exfoliated but obviously worked to rectangular shape. No sculpturing or relief is apparent. They lie next to each other in heavy undergrowth on the east slope of the Stirling Group, just south of the ball court. The larger (Monument 50) measures 109 x 80 x 40 cm., while the smaller measures 90 x 90 x 70 cm.

Monuments 52, 53 and 54

These pieces were found by Matthew Stirling in 1942, and are reported on elsewhere in this volume (pp. 35-39).

Monument 55 (pl. 12e)

This is a large stone bowl found in association with Drain No. 2. It is 29 cm. high and has a diameter of roughly 58 cm. The walls and bottom are 9 cm. thick. The piece is not quite complete, being in three fragments. Its original shape was not circular but more or less subrectangular.

Monument 56

This monument is an upright standing monkey with its head tilted back and its hands clasped behind its head. Made of basalt, the piece is roughly 124 cm. high, 54 cm. wide, and 43 cm. thick. It was recovered from the La Venta site some years ago and now stands in the Parque La Venta in Villahermosa. While it has been referred to as a "priest" (cf. Westheim 1963, fig. 6), we are convinced that it is in fact a monkey. (For another photo see Williams and Heizer 1965, pl. 1c.)

Monument 57 (pl. 13a)

This is a much-altered headless torso, 73 cm. high, 52 cm. wide, and 28 cm. thick. It is of an unusual greenish serpentine-like stone, and is very smoothly polished over all surfaces. This polishing is applied over the fracture caused by removal of the head and neck, and over the sculptured front portion and five axe-sharpening grooves as well. This original sculptured portion, very indistinct at present, consists of the upper part of a human chest and parts of the arms on either side. Very faint traces of a rectangular pectoral plaque suspended on a thin necklace remain. At the bottom center of the piece a U-shaped channel —also smoothly polished— has been cut, extending 20 cm. up the body of the monument.

Monument 58 (pl. 13b)

Fractured at both ends, sides, and back, Monument 58 is an 82 x 47 x 29 cm. fragment of a once larger piece of green schist. Most of the upper portion of the extant piece has exfoliated away, leaving only the lower lip and part of the fangs of a stylized jaguar mask in low relief at the bottom. The lower lip is bow-shaped, and the corners of the mouth are depicted with rectangular depressions.

Monument 59 (pl. 13c)

This interesting piece depicts a crouching jaguar body with a typically Olmec anthropomorphic face and head supporting a largish table or platform.

Made of basalt, it was found in the same general area as Monument 58 some years ago and was taken to the Parque La Venta. It is 95 cm. high, 65 cm. wide, and 113 cm. long. The piece is designated as No. 3 in the Parque La Venta.

Monument 60

Made of basalt, this small, hunched jaguar figure was first published by Williams and Heizer (1965, pl. 2a, 2b). It is badly eroded so that details are difficult to ascertain. It stands 60 cm. high, is 45 cm. wide, and 35 cm. thick. It is presently at the Parque La Venta.

Monument 61 (pl. 13d)

This is a round stone disc 32 cm. thick and with a diameter of 88 cm. On the front panel is carved a cross-legged, seated figure in low relief. The piece was once quite handsome but has been badly weathered, the relief now being difficult to discern. Nevertheless, it is possible to see that the seated figure wears a large, flowing headdress which recalls that of individual R in Stela 3, La Venta (Heizer 1967:29, fig. 1), and of the central figure in the El Viejon stela (Medellin 1960, pl. 9). Made of basalt, the monument was found in what is now the airstrip near Complex A.

Monument 62 (pl. 13e)

This is the exceptionally long basalt column presently in front of the Caseta at the Parque La Venta in Villahermosa. Made of basalt, the piece is 6.63 meters long and has a circumference of 1.35 meters. At least 23 axe-sharpening grooves appear at random along its exposed upper surfaces.

Monument 63

This designation has been assigned to the basalt stela with the low relief engraving "of a bearded man hugging a monster" (Pellicer 1959). It has been described by Williams and Heizer (1965:19, pl. 2d).

Monument 64 (pl. 13f)

This is a badly defaced, standing figure with a squat head, almond-shaped eyes, a short body wrapped in an indistinct garment, and two squatty, geometrically-proportioned legs. It is probable that the piece was once much larger and of entirely different appearance, but it has been heavily damaged, with the present eyes being relatively recent additions. Made of basalt, the monument is 54 cm. high, 40 cm. wide, and 31 cm. thick.

Monument 65 (pl. 14a)

This piece consists of a small human head with hands in front beneath it. The head carries a helmet-like headdress with indeterminable design, and circular lobe plugs. Made of heavily eroded basalt, the piece is 66 cm. high, 43 cm. wide, and 40 cm. thick.

Monument 66 (pl. 14b)

This is a large slab of greenish schist with a few geometric lines in incised low relief on the front. The piece is fractured sharply all around, and is badly exfoliated on most of the once-worked surface. It is 1.03 meters high, 1.73 meters long, with a thickness of 37 cm. This monument was probably once part of a stylized jaguar mask motif. The piece is designated No. 11 in the Parque La Venta.

Monument 67 (pl. 14c)

A large block of basalt which has been hammer dressed into its present shape as a bench-like object; no other decoration or sculpturing appears on the piece. It is 90 cm. high, 207 cm. long, and has a maximum thickness of 90 cm. This piece is designated No. 15 at Parque La Venta where it serves today as a bench for tourists viewing the monuments.

Monument 68

A large circular boulder with numerous axe-sharpening grooves, this piece has been described and illustrated by Williams and Heizer (1965:19, pl. 2c).

Monument 69 (pl. 14d)

This is a broken piece of greenish schist, badly fractured and scaled, with some low relief design remaining on a small portion of the flat surface. It is one meter long, 44 cm. wide, and 19 cm. thick.

Monument 70 (pl. 14e)

This is a fat, squatting "Janus" figure holding a metate(?) in its hands. On both sides of the head and on the back are carved almost identical faces; thus the "head" of the figure actually consists of four similar faces. Made of basalt, the figure is 83 cm. high, 56 cm. wide, and 73 cm. thick. It is illustrated by Williams and Heizer (1965, pl. 4c). The piece is somewhat like La Venta Monument 5, the so-called "Abuelita" (Stirling 1943).

Monument 71 (pl. 14f)

This is a large, roundish stone, somewhat head-shaped, with a stylized

jaguar nose and mouth executed in front. Seven small faces in low relief appear on the sides and top. There may have been more at one time, but if so they are now obliterated. The entire piece is smoothly polished and worn over most of its surface. It is 83 cm. high, 65 cm. wide, and 67 cm. thick.

Monument 72 (pl. 15a)

This piece is badly eroded; it is a large squatting figure, probably human. It wears a helmet over the head, but details of this portion are not discernible. It is apparent that ears and ear ornaments were present, but details have been obliterated. The arms rest upon the knees, which reach the level of the chest as the figure squats on its haunches. Five low relief small faces are faintly visible on the back of the piece, perhaps at one time having been part of the ornamentation of a cape. These faces are somewhat like those on Monument 71. It is unfortunate that the piece is so badly worn as it must have been quite impressive at one time. It stands 126 cm. high, is 70 cm. wide and 44 cm. thick.

Monument 73 (pl. 15b)

A seated, cross-legged human figure, this piece is small and well modeled. No decoration or clothing is present. It is 32 cm. high, 25 cm. wide, and 28 cm. at its thickest point.

Although each of the well preserved pieces described above displays certain unique qualities which set it apart from any other Olmec piece (this unique variability is in fact a defining feature of Olmec monumental sculpture), the new pieces from La Venta may be roughly grouped into a variety of broad categories. These categories, and the monuments which we have placed in each, are summarized in Table 1. As may be noted, the predominant category (aside from Miscellaneous) is that of seated or squatting figures. Four of the 1968 pieces and three pieces from the Museo de Tabasco fall into this category. From the frequency with which they occur at other Olmec sites (cf. Stirling 1965) it would appear that this category contains the most common type of monument presently known. No discussion is required here of the other broad categories of new monuments from La Venta since these are also known from other Olmec sites (ibid.)

In 1955, before Drucker and Heizer's major excavations at the site, 18 numbered stone monuments, 7 altars, and 5 stelae were known from La Venta. The 1955 work of Drucker and Heizer produced 9 more large numbered monuments. Since that time 18 pieces of sculpture from La Venta have made their way to either one of the two museums in Villahermosa. The 1968 field season at the La Venta site yielded 28 additional sculptures. Thus the present total of known pieces from La Venta is 73 numbered monuments, plus 7 numbered

altars, and 5 numbered stelae. Indications from several other Olmec sites are that they also contain large numbers of monumental worked stones or fragments thereof (cf. Medellin 1960; Coe 1966). As the corpus of known Olmec pieces grows, it is hoped that discussion may be facilitated by the use of standardized referent systems such as that provided above for the sculptures from La Venta.

TABLE 1

Categories of Newly Found or Newly Numbered La Venta Monuments

	Monument Number		
	Discovered 1968	In Parque La Venta	In Museo del Estrado
Seated or squatting figures	30, 31, 38, 40		70, 72, 73
Low relief fragments	33, 42, 58	66, 69	
Torsos	39, 57		
Heads	29, 44	65	71
Jaguar representations	28, 41	59, 60	
Bowls	45, 55		
Cylinders	32, 43		
Columns	35, 49	47, 62, 63	
Boulders	36a, 36b	68	
Miscellaneous	34, 46, 48, 50, 51, 52, 53, 54	37, 56, 61, 64, 67	
Totals	28	14	4

Grand total: 46

BIBLIOGRAPHY

Abbreviations Used

AAnt	American Antiquity
BAE	Bureau of American Ethnology
-B	Bulletin
HMAI	Handbook of Middle American Indians
INAH	Instituto Nacional de Antropología e Historia
-B	Boletin
KAS	Kroeber Anthropological Society
-P	Papers
UC	University of California
-ARF-C	Archaeological Research Facility, Contribution

Andrews, George F.
1967 Comalcalco, Tabasco, Mexico: An Architectonic Survey of a Maya Ceremonial Center. University of Oregon, Eugene.

Berger, Rainer, J. A. Graham and R. F. Heizer
1967 A Reconsideration of the Age of the La Venta Site. UC-ARF-C 3:1-24, Berkeley.

Blom, F. and O. LaFarge
1926 Tribes and Temples. Tulane University Press, New Orleans (2 vols.).

Breed, C. B. and G. L. Hosmer
1938 The Principles and Practice of Surveying. New York: J. Wile and Sons.

Carr, R. F. and J. E. Hazard
1961 Map of the Ruins of Tikal, El Petén, Guatemala. University Museum, University of Pennsylvania, Tikal Reports, No. 11.

Clewlow, Jr., C. W., R. A. Cowan, J. F. O'Connell and Carlos Benemann
1967 Colossal Heads of the Olmec Culture. UC-ARF-C 4, Berkeley.

Coe, Michael D.
1965 The Olmec Style and Its Distributions. HMAI 3:739-775.

1967a La segunda temporada en San Lorenzo Tenochtitlan, Veracruz. INAH-B 24:1-10, México, D.F.

1967b Solving a Monumental Mystery. Discovery, 3:21-26.

Coe, M. D., R. Diehl and M. Stuiver
1967 Olmec Civilization, Veracruz, Mexico: Dating of the San Lorenzo Phase. Science, 155:1399-1401.

Coe, M. D., R. A. Diehl, F. Beverido P., P. Krotser and R. Krotser
1966 Exploraciones arqueologicas en San Lorenzo Tenochtitlan, Veracruz. INAH-B 24:21-25, México, D.F.

Coe, W. R. and R. Stuckenrath, Jr.
1964 A Review of La Venta Tabasco, and Its Relevance to the Olmec Problem. KAS-P 31:1-43, Berkeley.

Corona, G.
1962 El Luchador Olmeca. INAH-B 10:12-13, México, D.F.

Covarrubias, Miguel
1946 Mexico South: The Isthmus of Tehuantepec. New York: A. Knopf.

Davis, R. E. and F. S. Foote
1953 Surveying: Theory and Practice. New York: McGraw Hill, Inc.

Drucker, Philip
1952 La Venta, Tabasco: A Study of Olmec Ceramics and Art. BAE-B 153, Washington.

Drucker, P. and R. F. Heizer
1965 Commentary on W. R. Coe and Robert Stuckenrath's Review of Excavations at La Venta, 1955. KAS-P 33:37-70, Berkeley.

Drucker, P., R. F. Heizer and R. J. Squier
1957 Radiocarbon Dates from La Venta, Tabasco. Science, 126:72-73.

1959 Excavations at La Venta, Tabasco, Mexico, 1955. BAE-B 170, Washington.

Foster, G. M.
1964 Treasure Tales, and the Image of the Static Economy in a Mexican Peasant Community. Jour. Amer. Folklore, 77:39-44.

Hawkins, G. S.
1965a Stonehenge Decoded. Garden City, N.Y.: Doubleday.

1965b Sun, Moon, Men and Stones. Amer. Scientist, 53:391-408.

Heizer, Robert F.
1960 Agriculture and the Theocratic State in Lowland Southeastern Mexico. AAnt 26:215-222.

1961 Inferences on the Nature of Olmec Society Based Upon Data from the La Venta Site. KAS-P 25:43-57, Berkeley.

1967 Analysis of Two Low Relief Sculptures from La Venta. UCARF-C 3:25-55, Berkeley.

1968 New Observations on La Venta. (To appear in a volume of symposium papers on Olmec culture published by Dumbarton Oaks, PreColumbian Collection.)

Heizer, R. F. and P. Drucker
1968 The La Venta Fluted Pyramid. Antiquity, 42: 165:52-56. England.

Medellin Zenil, Alfonso
1960 Monolitos ineditos Olmecas. La Palabra y el Hombre, 16:75-98, Xalapa.

Pellicer, Carlos
1959 Museos de Tabasco. INAH, México, D.F.

Piña, Chan, R. and Luis Covarrubias
1964 El Pueblo del Jaguar. Museo Nacional de Antropología, México, D.F.

Stirling, M. W.
1943 Stone Monuments of Southern Mexico. BAE-B 138, Washington.

1955 Stone Monuments of the Rio Chiquito, Veracruz, Mexico. BAE-B 157:1-23, Washington.

1965 Monumental Sculpture of Southern Veracruz and Tabasco. HMAI 3:716-738.

Thom, A.
1965 Megalithic Sites in Britain. Clarendon Press, Oxford.

1966 Megaliths and Mathematics. Antiquity, 40:121-128.

Wedel, W. R.
1952 Structural Investigations. BAE-B 153:34-79, Washington.

Westheim, Paul
1963 The Sculpture of Ancient Mexico. Garden City, N.Y.: Anchor Books.

Williams, H. and R. F. Heizer
1965 Sources of Rocks Used in Olmec Monuments. UCARF-C 1:1-40.

Explanation of Following Illustrations

Plate 1 — La Venta pyramid. Photo from helicopter, looking north-northwest.

Plate 2 — La Venta pyramid

a. Pyramid in early January, 1968, before clearing vegetation, looking northwest.
b. Pyramid after clearing, looking southwest
c. Airphoto of pyramid, looking south. Area of Complex A is in foreground.
d. Looking east. The 1940 test pit holes show on the north face at left, as do the eroded valleys of the west face. In foreground, airfield and houses on the archaeological zone.

Plate 3 — Pyramid air views

a. The cleared pyramid, looking south.
b. Looking northwest.

Plate 4.

a. Pyramid from the air, looking northwest.
b. M. Stirling's pit dug in 1940 to examine row of upright basalt columns in present Acropolis in Stirling Group.
c. Cleared pyramid, looking north along centerline.
d. Type III drain trough.

Plate 5 — Drain No. 1, Stirling Group

a. Looking toward west; exit of drain in foreground.
b. Looking west. Trough stone at bottom of photo is at midpoint of photo in a; drain now cleaned out.
c. "Headgate" at west end of Drain No. 1. Compare with Figure 2 (p. 145); cover stones removed.
d. Drain No. 1 from west end ("headgate"), looking east.

Plate 6

a. Drain No. 5, showing mortised trough stone which is Monument 46. Note cover slab of sandstone, remnant of asphalt joint sealant in mortise.
b. The single mortised trough stone of Drain No. 5.
c. Stone bowl (Monument 45) and lid. Lid rests directly on clay structure fills and bowl is sunk in these clays. Note overlying surface drift sands. In lower right part of the "temescal."

Plate 7
a. Drain No. 2, looking east. Note "headgate" stones in foreground and stone bowl (Monument 55) at top.
b. Drain No. 3, looking south. Note single stone which may be remnant of "headgate."
c. Drain No. 4, looking north. Note "headgate" stones in foreground and gaps in sequence of inverted drain troughs.
d. Drain No. 2, showing stone bowl (Monument 55).

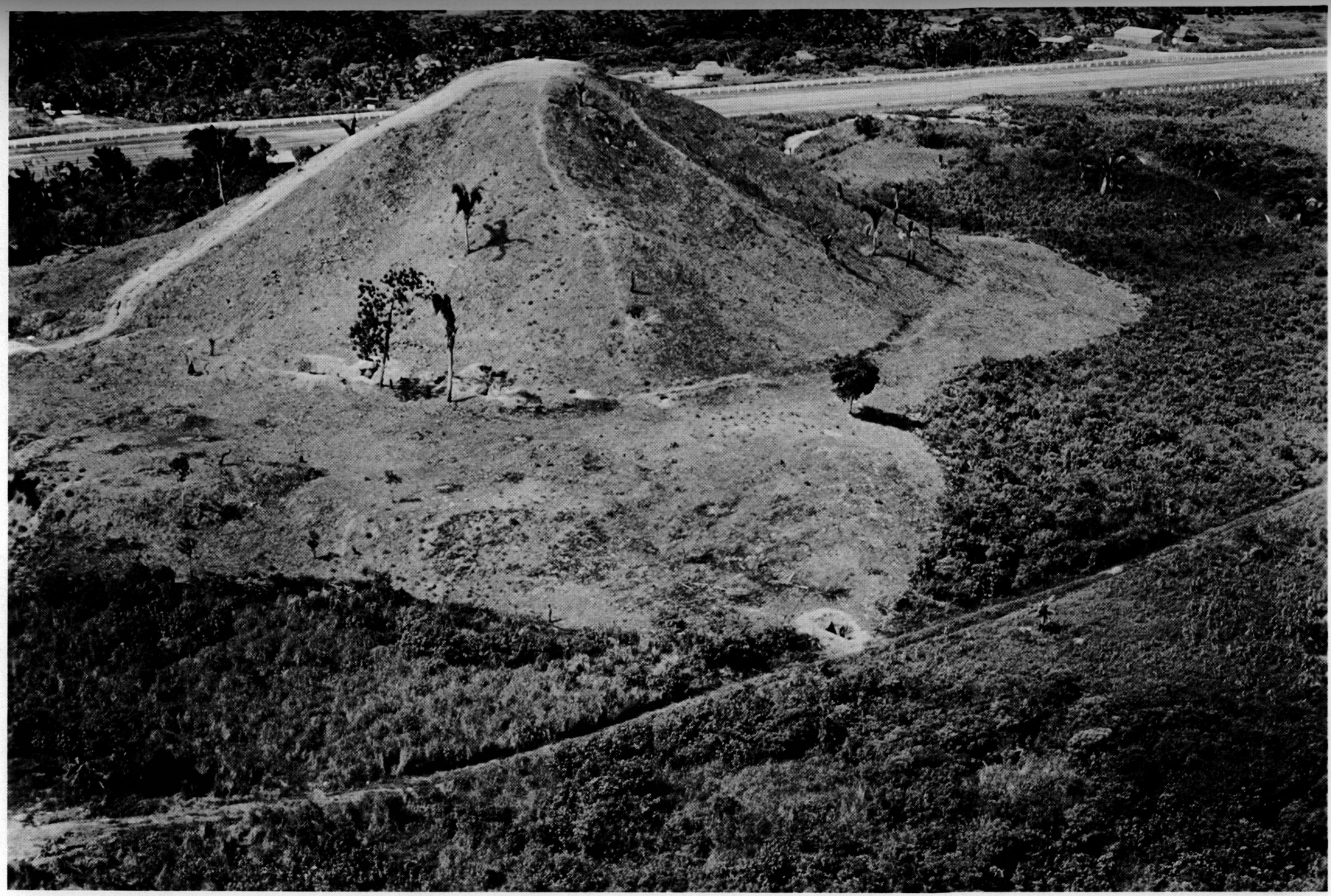
Plate 8
Ceramic specimens from test pits
a. Solid figurine from Test Pit 1968-1; height 9 cm.
b. Ditto
c. Coarse Brown jar from near Drain No. 2; height 36 cm.
d. Effigy bowl from Test Pit 1968-1; height 10 cm.

Plate 9
Monuments
a. No. 28
b. No. 29
c. No. 30
d. No. 31
e. No. 32
f. No. 33

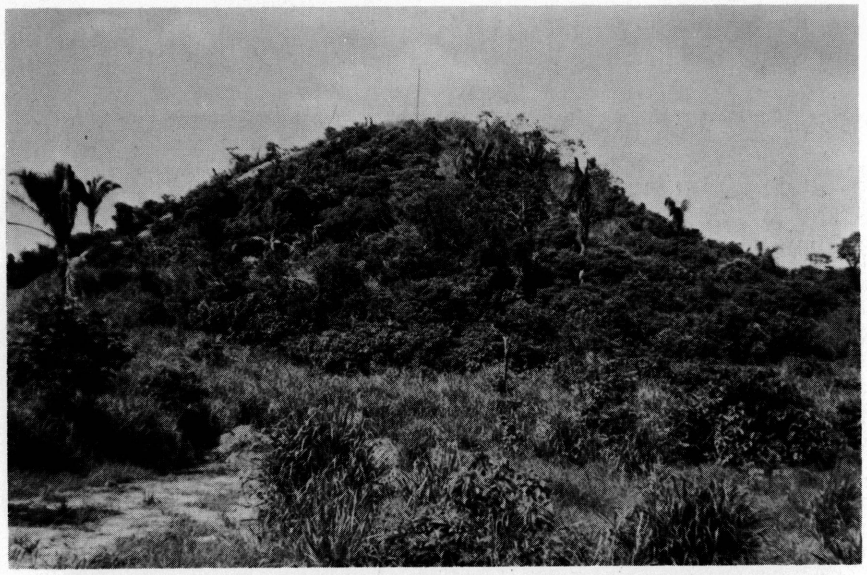
Plate 10
Monuments
a. No. 34
b. No. 36a
c. No. 35
d. No. 38
e. No. 36b
f. No. 39

Plate 11
Monuments
a. No. 40
b. No. 41
c. No. 43
d. No. 42
e. No. 44, front view

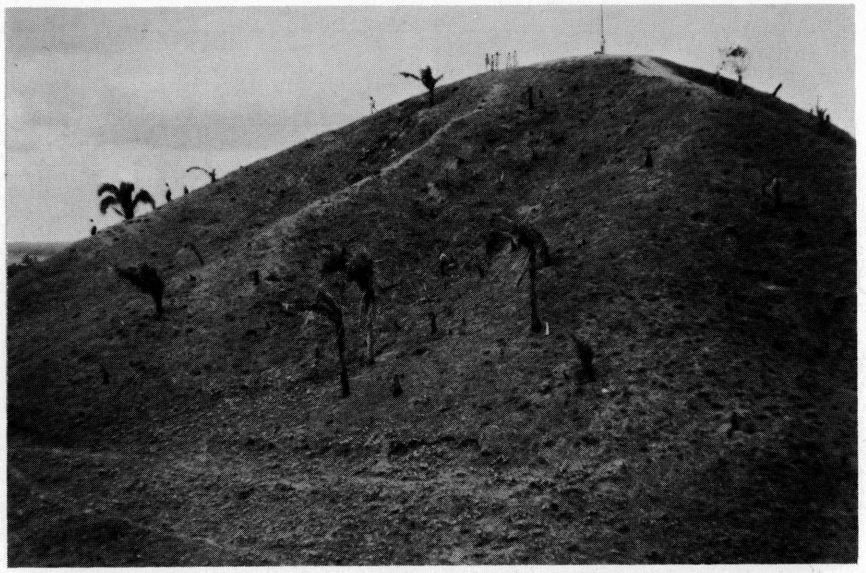
Plate 12
Monuments
a. No. 44, side view
b. No. 45, note lid in left foreground
c. No. 46
d. No. 48
e. No. 55
f. No. 47



Pl. 1 Airview of La Venta pyramid, looking north-northwest



a



b

c

d

Pl. 2 Ground and air photos of La Venta pyramid

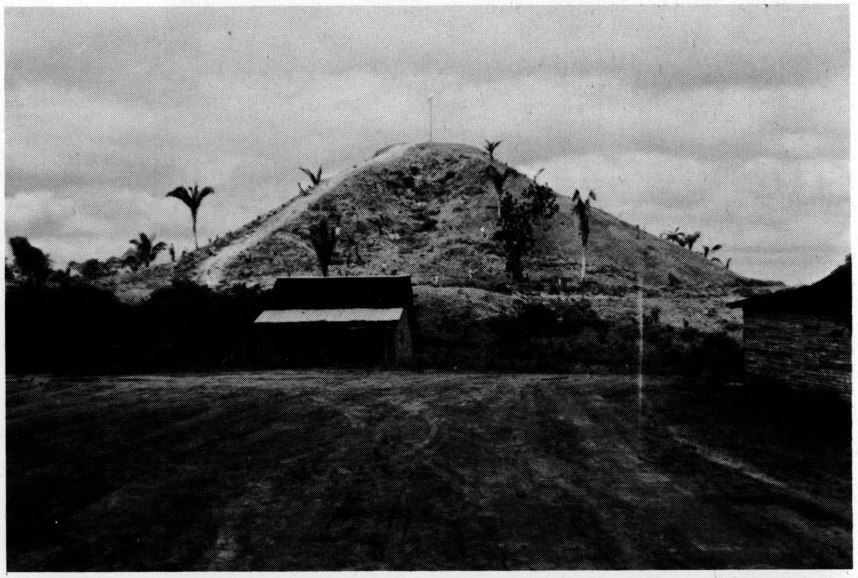
a

b

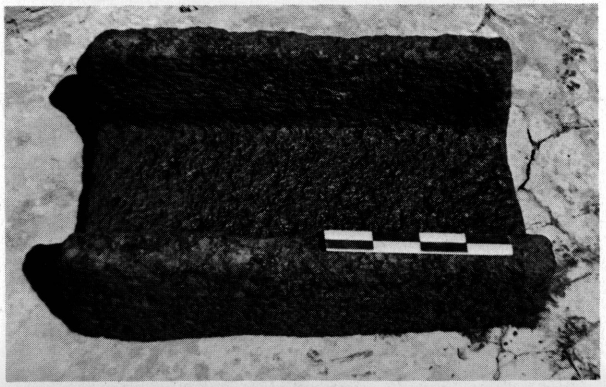
Pl. 3 Pyramid air views

a

b

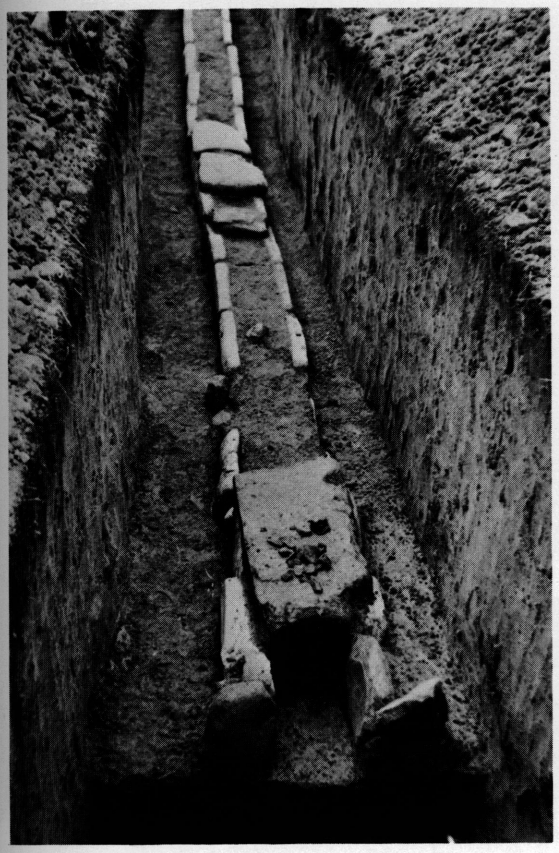


c

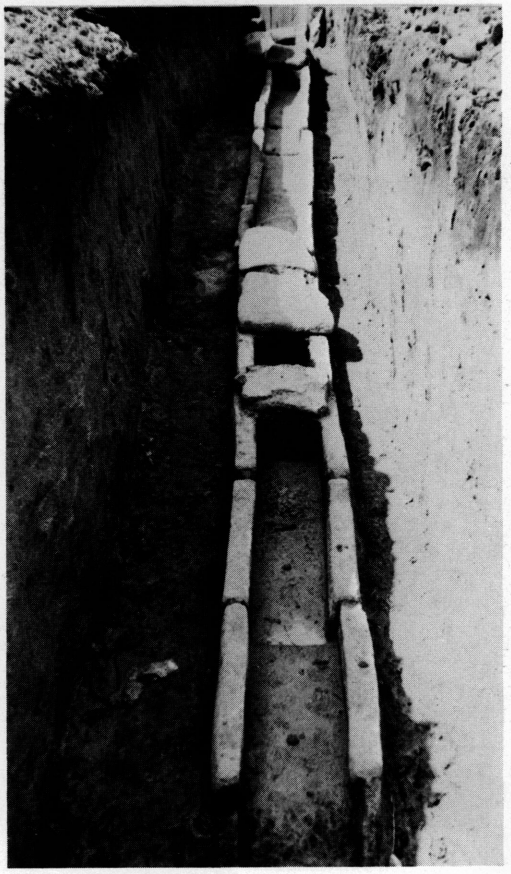


d

Pl. 4 Pyramid; basalt columns in Stirling Group; drain trough stone.

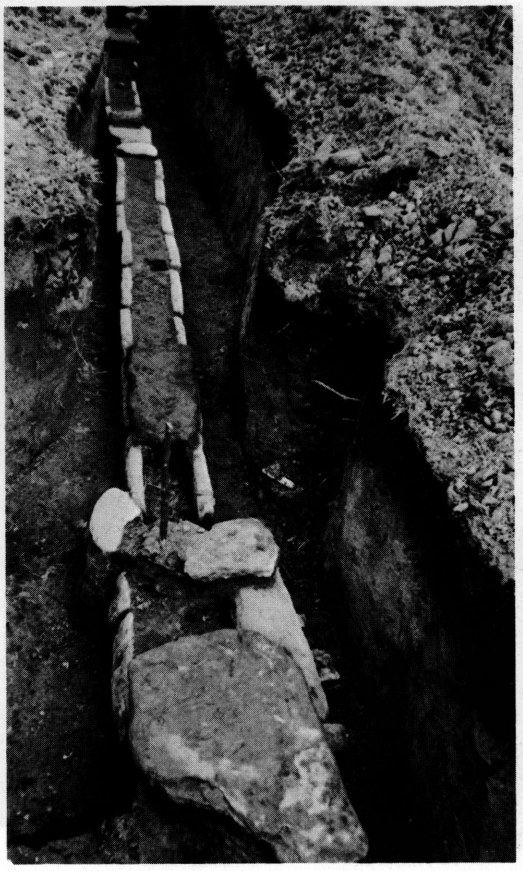


a



b

c



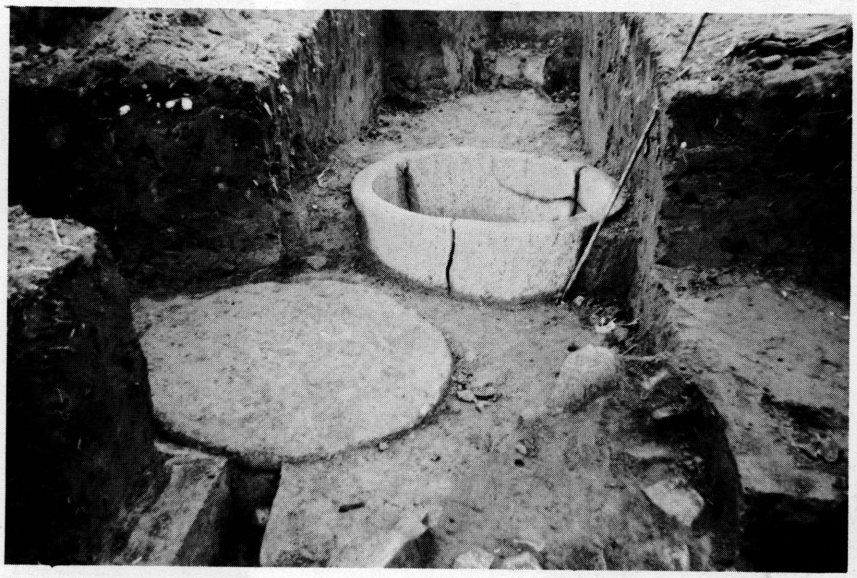
d

Pl. 5 Drain No. 1, Stirling Group

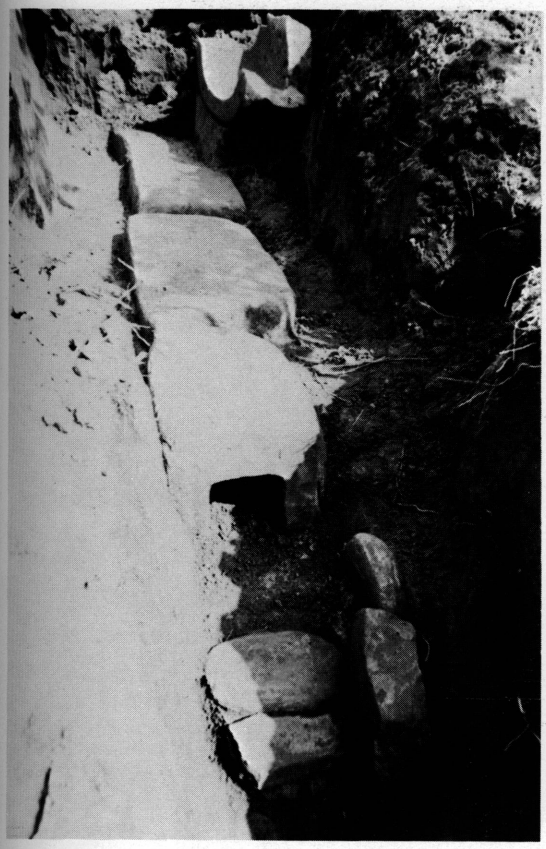
a

b

c



Pl. 6 Drain No. 5; Monument 45



a

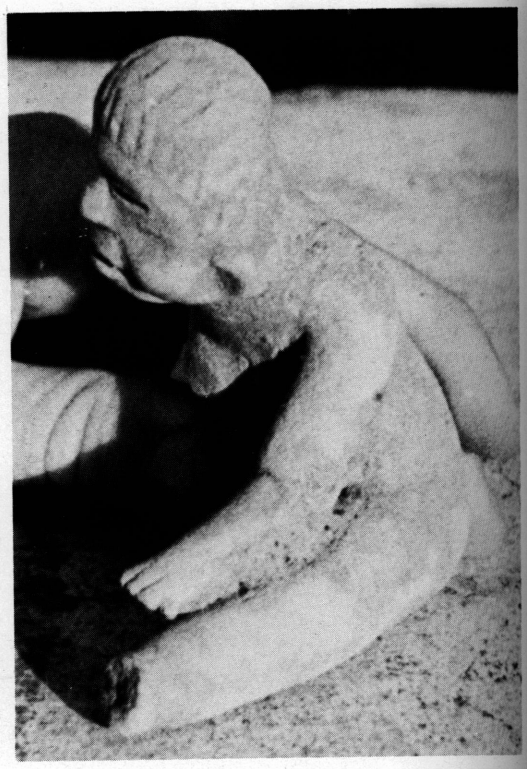
b

c

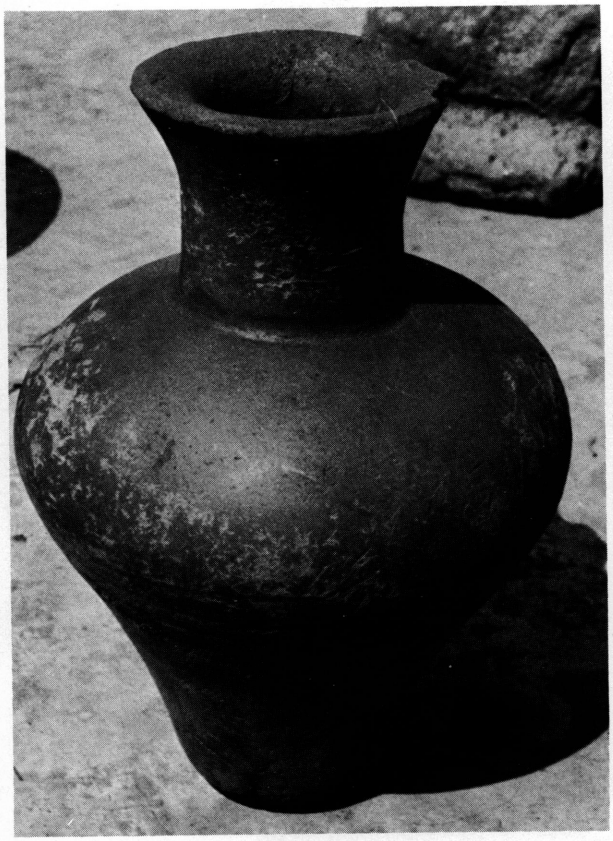
d

Pl. 7 Drains Nos. 2, 3, 4

a



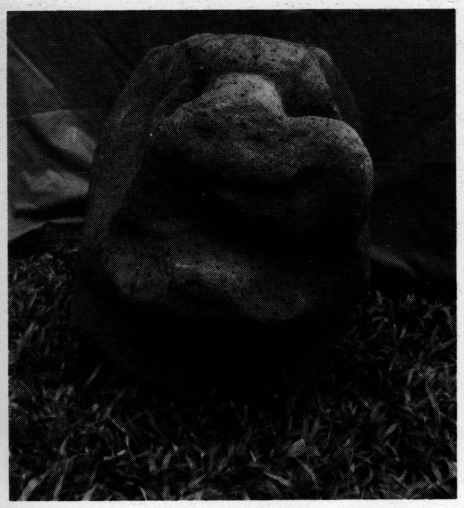
b



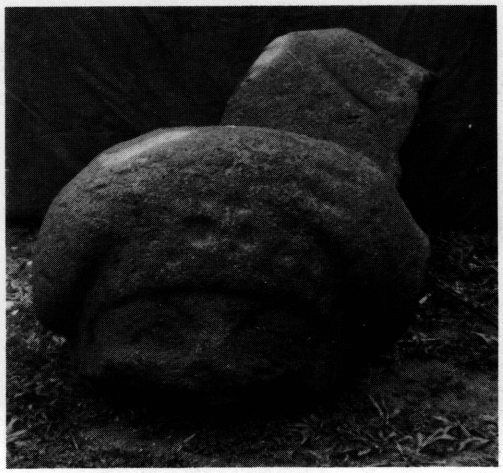
c

d

Pl. 8 Ceramic specimens from test pits

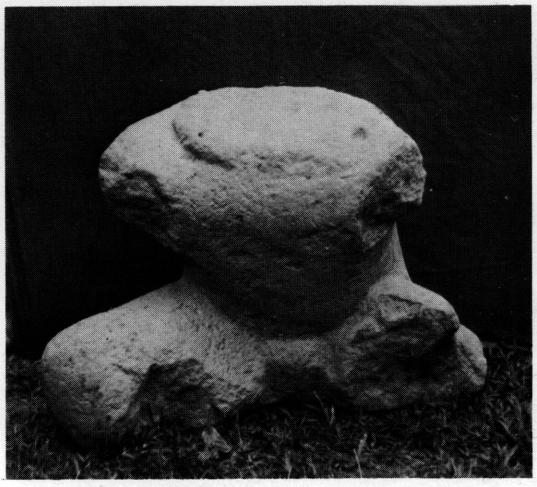


a

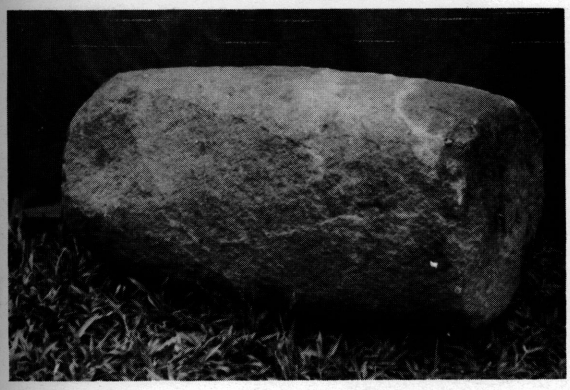


b

c



d



e

f

P1. 9 La Venta Monuments

a

b

c

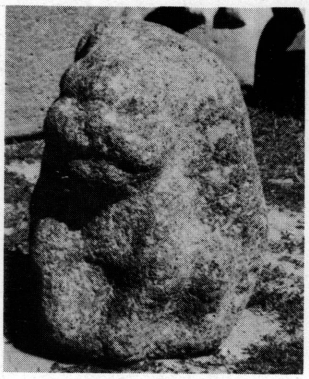
e

d

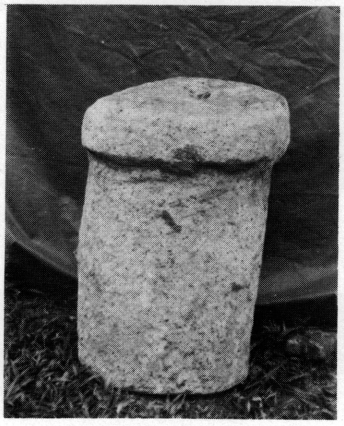
f

Pl. 10 La Venta Monuments

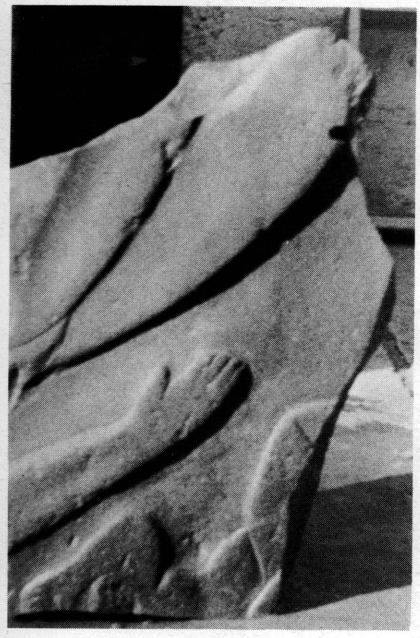
a



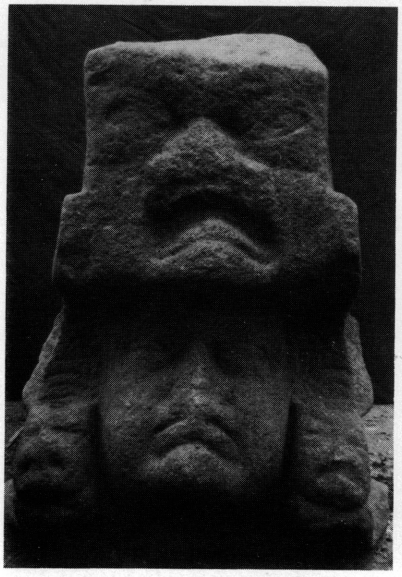
b



c



d



e

Pl. 11 La Venta Monuments

a

b

d

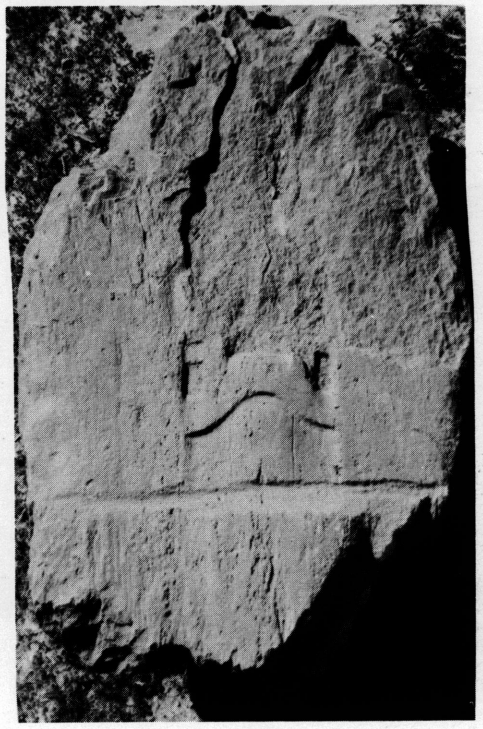
c

f

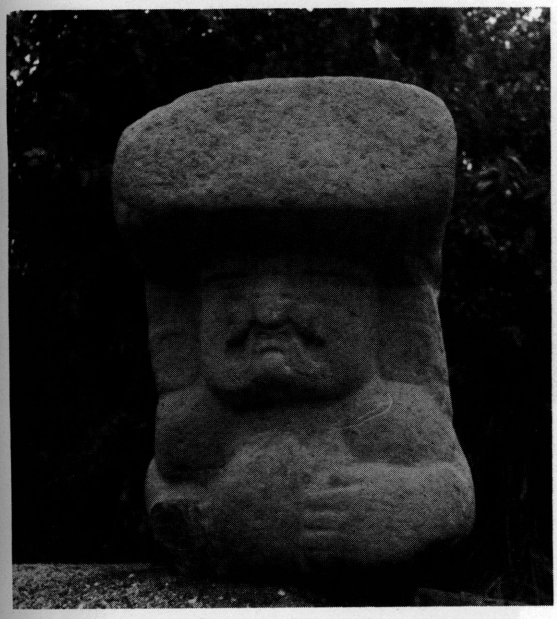
e

Pl. 12 La Venta Monuments

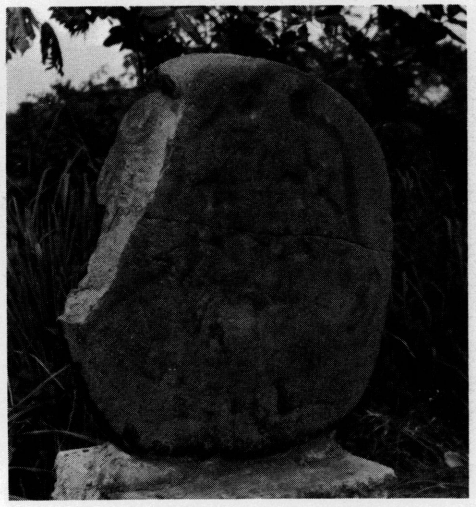
a



b

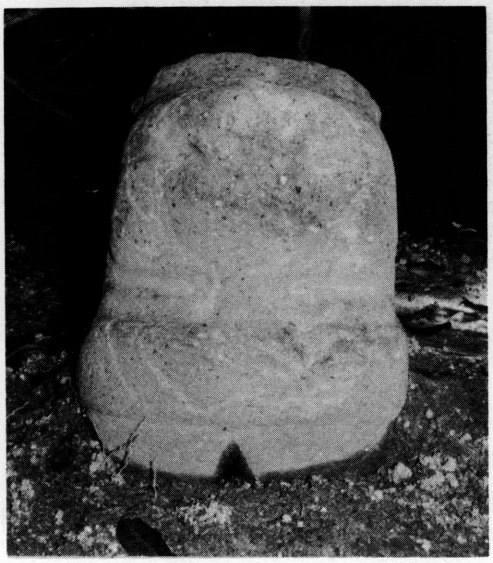


c



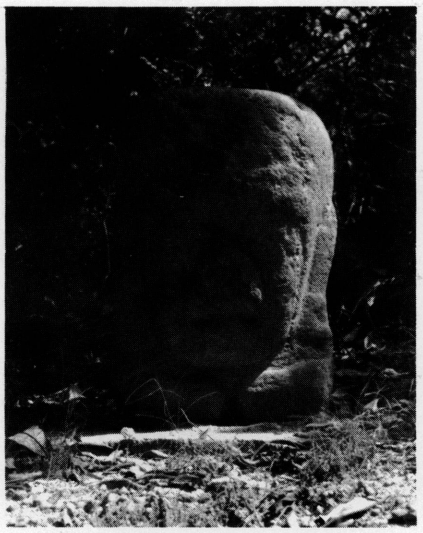
d

e



f

Pl. 13 La Venta Monuments



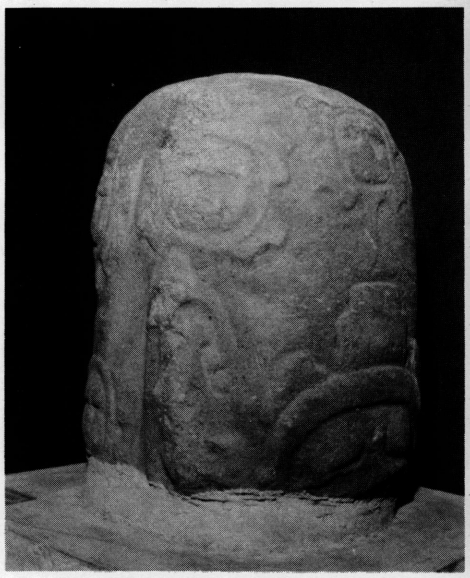
a

b

c

d

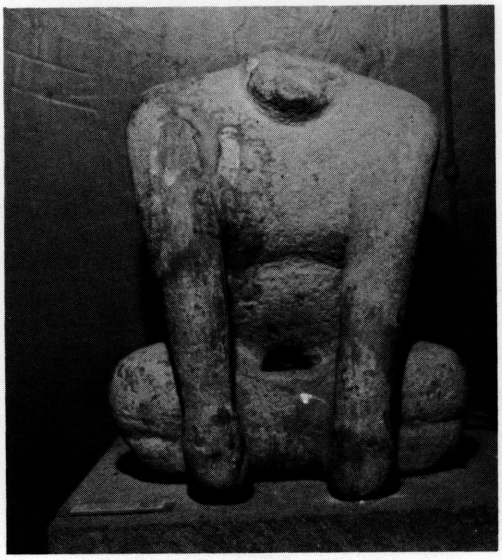
e



f

Pl. 14 La Venta Monuments

a

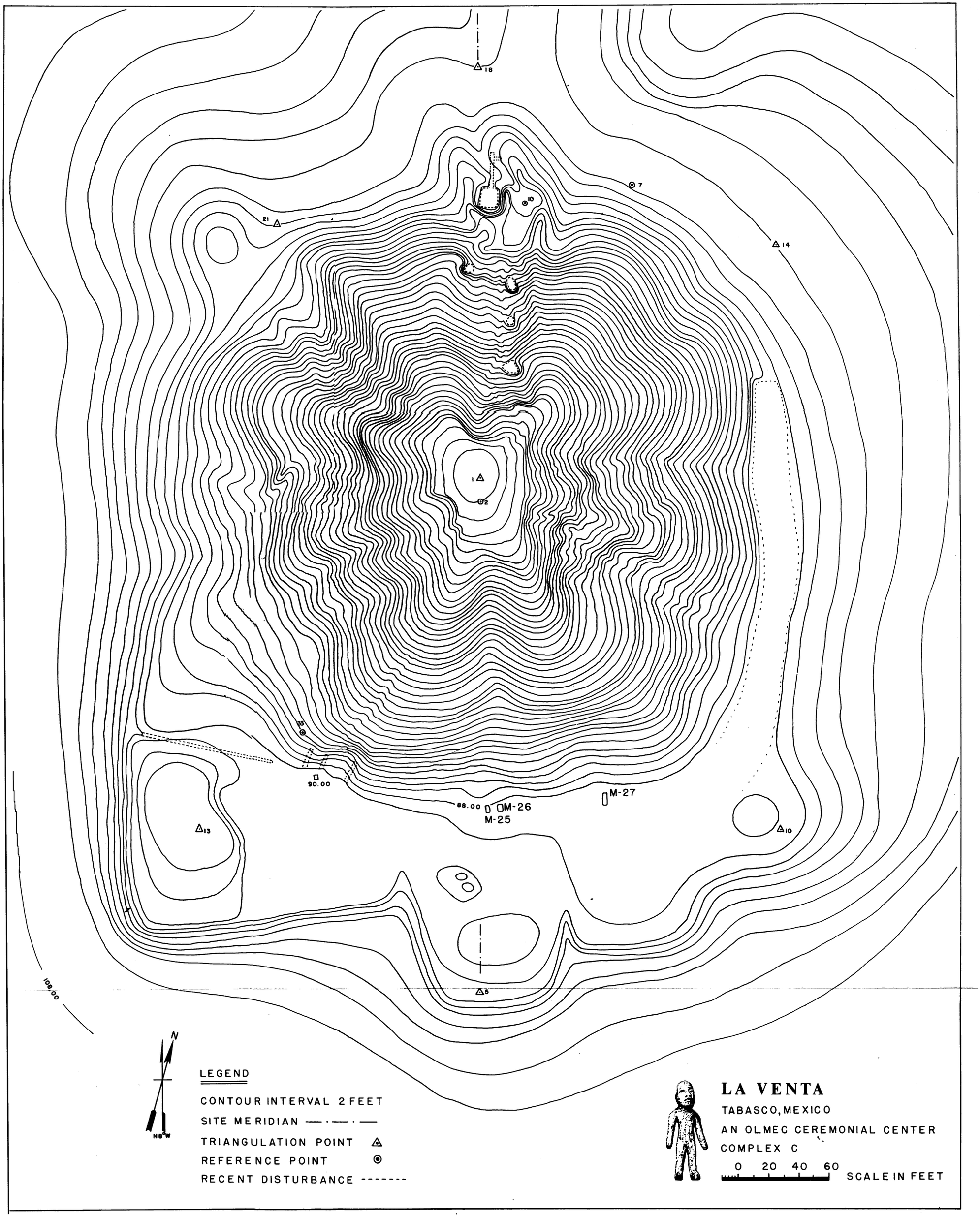


b

c

d

Plate 15



LEGEND

CONTOUR INTERVAL 2 FEET

SITE MERIDIAN —·—·—

TRIANGULATION POINT △

REFERENCE POINT ⊙

RECENT DISTURBANCE -------

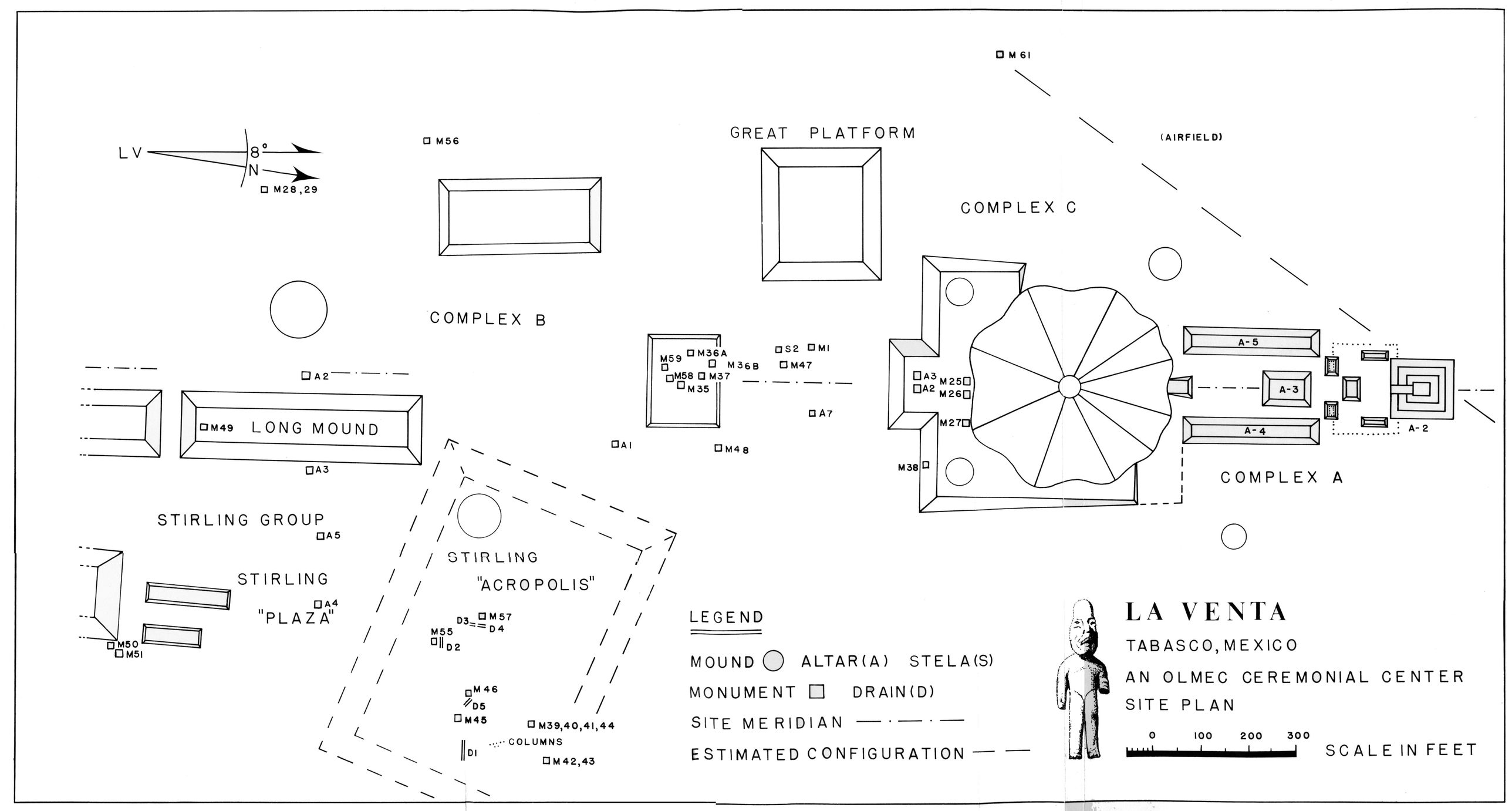
LA VENTA

TABASCO, MEXICO

AN OLMEC CEREMONIAL CENTER

COMPLEX C

0 20 40 60 SCALE IN FEET



LA VENTA

TABASCO, MEXICO

AN OLMEC CEREMONIAL CENTER

SITE PLAN